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MODERN PRIMARY ARITHMETIC

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INTRODUCTION

THE attention of teachers is directed to the following considerations that have guided the authors in the preparation of this series of arithmetics:

1. Thoroughness in the Fundamentals.

The first aim has been to secure thoroughness and facility in the use of the four fundamental processes, common fractions, and decimals.

2. Choice of Applications.

Applications, a knowledge of which is a daily necessity to the mass of men and women in active life, have received greatest attention.

Applications that are of use only to people in special fields of activity, or in particular communities, have been treated in a separate group, where they may be drawn upon as needed.

Those applications that have become unnecessary by reason of changed social needs, and those that have never served any purpose, other than that of filling the pages of a textbook, have been omitted altogether.

3. Simplification of Processes.

The number of technical terms, definitions, cases, and special processes has been reduced to the minimum. Thoroughness in a few simple, direct, general processes has been made possible by this treatment.

4. Problems from Real Life.

The problem material is drawn from the life in which children and their parents are living to-day. It is within their knowledge or experience, and presents real, rather than imaginary situations.

5. Continuity of Plan.

There is a continuity of purpose running through the entire series. The attention of pupils should be called again and again to the recurrence of a familiar fact or principle in a new application.

It is this characteristic that suggests the term *cumulative* as descriptive of the plan of the series.

6. Recognition of Differences in Ability of Children.

It is possible for all normal children to learn the fundamental facts of arithmetic. Some will learn them much more quickly than others. Some will be able to solve more difficult problems than others. The *Modern Arithmetics* furnish material adapted to these various grades of ability. It is as grievous an error to permit the stronger pupils to pass along by meeting merely the minimum requirement, as to expect the weaker ones to perform tasks beyond their ability.

SUGGESTIONS TO TEACHERS

TEACHERS using the First Book should familiarize themselves with the entire series, so that they may grasp the purpose of the primary approach.

The appeal should be made to the child's *observation and memory* rather than to his reason. A little child *sees and senses* many things that he cannot explain. When once the child has *sensed* a number fact, he should be made to memorize it, and use it until its use becomes as automatic and unconscious as walking, or talking.

In this drilling process, much use may be made of the child's play and social instinct.

Waste of time must be guarded against. A game in which number is merely incidental is expensive of time. It gives too much play with too little number. A game of baseball or bean bags is fine for recreation, but involves so little of numbers that it is impractical for drill purposes.

On the other hand, such games as those described in this text, where the game itself *is numbers*, can be made a most profitable means of drill.

The primary teacher who can utilize the play instinct of children effectively in rapid drill work, who can keep account of the successes and failures of individual children, who can lead the child to take an interest in his own progress, and assume responsibility for it, will not be disappointed in results.

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PRIMARY ARITHMETIC

PART ONE. FIRST YEAR

SUGGESTED COURSE FOR FIRST YEAR

a. **Writing Numbers to 20.**

b. **Addition and Subtraction Combinations with Sums to 10.**

MATERIALS

Beads	**Peas**
Colored Sticks	**Lentils**
Pegs	**Corn**
Rules	**Flash Cards of Combinations**
Domino Cards	**Pictures**
Toy Money	**Toys and Other Articles of Trade**

NOTE. — The work given in this book as belonging to the first year is intended to suggest the *kind* rather than the *amount* of work to be given to first-grade children. In many schools, particularly those that accept children five years of age in the first grade, it may be inadvisable to attempt any formal work with numbers; while other first-grade classes whose members are six, seven, or more years of age may accomplish more work than is here indicated. The allotment of work for the two divisions of the second year must be construed with the same allowance for age and other considerations.

But few devices have been described in the first-year course. Every wide-awake primary teacher knows the value of dramatization, playing store, the game element, etc., and is quick to invent and adopt the proper device as needed.

TO THE TEACHER. — Have pupils count objects less than ten in number. Let some pupils count as far as they can. The following exercises are suggestive of many that may be given:

1. Count the desks in your row, touching each one as you count.

2. Count the boys in the class.

3. Pupils close eyes and count the sounds while teacher taps the desk; while John walks to the door; while Sarah knocks on the door.

4. Frank closes his eyes while Ellen touches him on the shoulder several times. Frank tells how many times, and class verifies his answer.

5. Write figures 1 to 9.

6. As above, have children practice counting to 20.

7. Tie ten sticks in a bundle, thus,

8. Count out several such bundles, and call each bundle "a ten."

9. Place one bundle on the table and one stick beside it, thus,

How many sticks are there? Write 11.

10. Place another stick with it, thus,

How many sticks are there? Write 12.

11. Go on in this way to twenty.

1 2

12. Write 10. The right hand figure shows how many single sticks. Remove all. None left. Hence a zero.

13. Find nine pieces of chalk.

14. Lay four sticks to make a square.

15. Class count the steps (aloud) to see if Rupert can walk to the desk in six steps; to see if Kate can cross the room in nine steps.

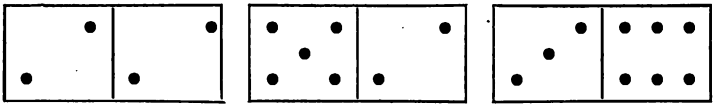
1. How many seats are there in your row? Write it in figures.

2. Write the number of panes of glass in your schoolroom.

3. Write your age.

4. Write the number of letters in your name.

5. Tell quickly the number of spots on each of these dominoes. Write each number.

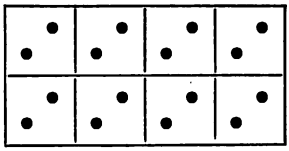


6. Write the number of fingers on both of your hands.

7. How many fingers and thumbs have you?

8. How many toes have you? Write it.

9. Write the number of squares in this drawing.



10. Write the number of dots.

11. Find page ten in your reader.

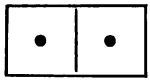
12. Which page comes after page 12?

13. Which page comes before page 8?

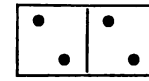
14. Let every pupil begin with 1, and write numbers as far as he can. Who can go farthest?

NOTE. — The teacher should recognize differences in children, and give the stronger ones an opportunity to test their power. When work is made too easy, interest is killed as effectually as when it is made too difficult. Children enjoy the discovery of ability to go beyond their former limitations. They should be encouraged to attack new problems in the spirit of discovery.

1. One dot and one dot are how many dots? One square and one square are how many squares? One and one are how many? Cover one dot. How many are left? One dot taken away from two dots leaves how many? One from two leaves how many? One and how many make two? (Similarly with pegs, lentils, etc., having all children use them.) Take 2 and 1, 3 and 1, 4 and 1.



2. Two dots and two dots are how many dots? Two books and two books? Two boys and two boys? Two and two are how many? Two and how many make four?



Cover two dots. How many are left? Two dots taken away from four dots leave how many? 4 less two are how many? Use other counters.

3. Four marbles and one marble are how many marbles?

4. Take 1 marble from 5 marbles. How many are left? (Similarly with lentils, sticks, crayons, etc.)

5. Four and one are how many? 5 less 1 are how many?

6. Three marbles and two marbles are how many marbles?

7. 2 marbles taken away from 5 marbles leave how many marbles? 3 marbles taken away from 5 marbles leave how many marbles?

8. 5 less three are how many? 5 less 2?

TO THE TEACHER. — Using objects, teach, "Five blocks and one block are six blocks. One block taken away from six blocks leaves five blocks." So on to "1 and 9."

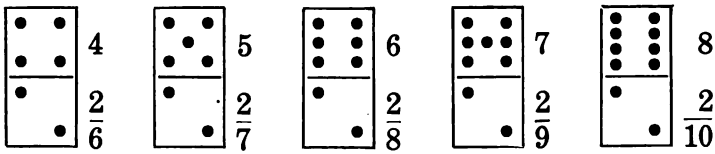
1. (Using the blackboard.)

and are 6 blocks

 less are 5 balls

2. Don has how many rabbits? Three rabbits and two rabbits are how many rabbits? If Don put 5 rabbits in his pen and two of them got out, how many were left, etc.?

(Play these number stories, children being rabbits.)



(Call them chickens, sheep, pigs, rabbits, etc.)

Question as follows: Charlie had 4 rabbits in one pen and 2 in another. How many in all?

Four rabbits ran away. How many were left?

Two rabbits ran away. How many were left?

4 and 2 are how many?

2 and 4 are how many?

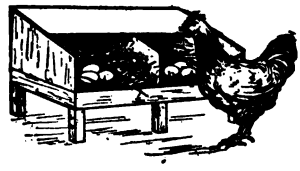
6 less 2 are how many?

6 less 4 are how many?

4 and how many are 6?

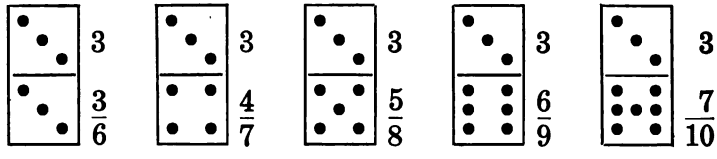
2 and how many are 6?

NOTE. — Give much practice in adding 1 and 2 to other numbers.



How many eggs are there in each nest? How many in all?

Three eggs and three eggs are how many eggs? Take away three eggs. How many are left? 6 eggs less 3 eggs are how many eggs? 3 and 3 are how many? 6 less 3 are how many?



Treat this table like that of the 2's on the preceding page.

Keep up the Review with both oral and "seat" work like the following:

2	3	5	7	9	2	2	2
1	1	1	1	1	2	3	4
2	3	?	2	?	7	?	?
?	?	1	?	1	?	4	8
3	4	5	4	10	9	6	10
3	4	?	7	6	?	1	3
3	?	5	?	?	8	?	?
?	7	8	9	8	10	9	10

Jessie had 7 white chickens and 2 brown ones.

How many chickens had she?

Jessie gave away 2 chickens. How many had she left? A hawk caught two more chickens. How many were left then? Let children make questions.

1. How many fingers on your left hand? On your right hand?

How many fingers have you?

Four fingers and four fingers are how many fingers?

Hold up your hands like the picture.

How many fingers do you show?

Put one hand behind you. How many of your fingers do I see? Eight less four are how many?

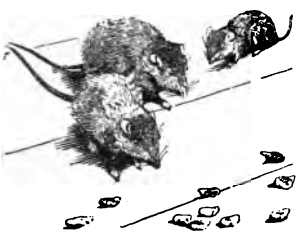
Four and what make eight?

(Use the domino device to teach 4 and 5, 4 and 6, 5 and 5.)

A nickel is five cents. A nickel and 2 cents are how many cents?

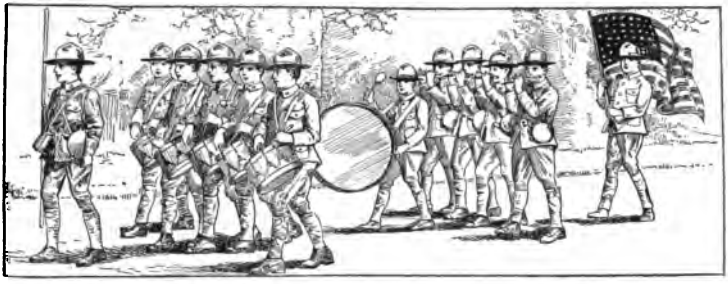
(Make many problems using the nickel for 5 cents.)

2. How many kernels of corn do you see? If the mouse eats 4 kernels, how many will be left? If it eats 6 kernels, how many will be left? If it eats 5 kernels? Three kernels? Two kernels?



3. Ten cents make a dime. If you buy a five-cent pad and give the clerk a dime, how many cents should you receive in change? A five-cent piece and how many pennies make a dime?

4. Charlie saved ten cents and then bought a pencil and pad for 6 cents. How much money had he left? 10 less six are how many? 10 less 4? 10 less 8?



1. There are how many drums in this picture?

2. One is a bass drum. How many other drums are there? How many fifes are there?

3. How many more drums than fifes are there?

4. Four fifers, one color bearer, and one leader are how many boys?

5. Four fifers and six drummers are how many boys?

6. If the scouts march around two squares, how many blocks will they march? Draw the squares.

7. If they march three blocks away, and then back to the starting place, how many blocks do they march?

8. If they march 2 miles on Monday and 3 miles on Tuesday, how many miles do they march in both days?

9. When they march 3 blocks with music and 4 blocks without, how many blocks do they march?

10. When they march around the square twice, how many blocks do they go? Make a picture of the square.

11. If they have marched 9 blocks away from home and 5 blocks toward home, how far from home are they?

PART TWO. SECOND YEAR

SUGGESTED COURSE FOR SECOND YEAR

1. FIRST HALF (Work covered in pages 1–21).

a. Writing numbers to 100.

b. All combinations to 12.

c. Have pupils compare, count, build, and describe. Lead them to discover problems and state them.

d. Teach pint and quart, applying in practice on number 2.

2. SECOND HALF (Work covered in pages 20–45).

a. Addition to 20.

b. Subtraction with minuend not greater than 18 and subtrahend not greater than 10.

c. Multiplication and division, products not greater than 21.

d. One half, one third, etc., applied to combinations of 2, 3, etc.

e. Yard, foot, inch, gallon, applied in practice on combinations.

WRITING NUMBERS TO 100

1. Take two tens and one; thus:
How many? Write it; thus:

2. Lay counters for 22, 23, 25, 27, 29.

3. Lay counters for thirty-one, forty-three.

4. Count as far as you can.

5. Put 1 ten with 90 (nine-tens) and you have how many tens?

6. How many tens make 100?

7. Write fifteen; eighteen; fourteen.

8. Write twenty-five; thirty-seven; forty; ninety-six.

1. In writing ten we use the figure **1** for the ten bundle and **0** to show that there is none over; thus:

10

2. Take two tens. How many sticks in all?

3. To write twenty, we use **2** to stand for 2 *tens* and **0** to show that there is *none* over; thus:

20

(Similarly for 30, 40, etc. to 90.)

Twenty means **two-tens.**

Thirty means **three-tens,** etc.

4. Count by tens from 10 to 100.

5. Write eighty-two; seventy; forty-nine; sixty-one.

6. Write the number of desks in your room.

7. Write the number of stars on our flag.

8. Write your own age.

9. Count fifty, forward and backward.

10. Write in words 16, 19, 20, 43, 69, 38, 42, 71.

11. Write the number of books on the teacher's desk.

12. Write the number of panes of glass in your schoolroom.

13. Read 25, 21, 38, 45, 36, 28, 72, 64.

Write them in a column so that the *tens* will be in a vertical line.

14. Count from 50 to 100 and from 100 to 50.

15. Write in figures all the numbers to one hundred that have 0's in them.

1. Lay nine counters; thus:

Lay two more counters.

How many in all?

How many apples are 9 apples and 2 apples? 9 cents and 2 cents? 9 and 2 are how many?

2. Count these apples.

Give away two of them.

How many are left? If you have 11 oranges and give away 9 of them, how many are left?

Eleven less 2 are how many? Eleven less 9?

3. Make a story about 9 chickens and 2 chickens.

4. Make a story about 2 cookies and 9 cookies.

5. In the number 12, the 1 stands for ten and the 2 shows that 12 are 2 more than 10. 10 and 2 are how many? 12 less 2? 12 less 10?

NOTE. — In a similar manner teach the remaining combinations of addition and subtraction to 15.

Drill in addition and subtraction to 12 may take the form of the following game: Prepare duplicate sets of cards containing the numbers from 1 to 12. Pass them out, giving one to each child. If there are fewer than 24 pupils, let some take two cards. Two pupils will have each number. Let one pupil stand in front and give out questions like these: "3 and 4?" "7 and 5?" "11 less 3?" etc. The pupil having the number which answers the question must stand. If a pupil fails to stand when he has the answer, or stands at the wrong time, he must go to the front and yield his place and cards to the one who was at the front.

"**And**" is written + to save time.
"**Less**" is written − to save time.
"**Are**" is written = to save time.
5 + 4 = 9, means 5 and 4 are 9.
9 − 4 = 5, means 9 less 4 are 5.

1.	2 + 3 = ?	5 − 3 = ?	5 − 2 = ?
2.	2 + 4 = ?	6 − 4 = ?	6 − 2 = ?
3.	2 + 5 = ?	7 − 2 = ?	7 − 5 = ?
4.	2 + 6 = ?	8 − 2 = ?	8 − 6 = ?
5.	3 + 3 = ?	6 − 3 = ?	2 + 2 = ?
6.	3 + 4 = ?	7 − 4 = ?	7 − 3 = ?

7. Write the table of 2's in addition as far as you can go; thus: 2 + 0 = 2
2 + 1 = 3
2 + 2 = 4 etc.

8. Write the table of 3's in the same way.

9. Write other tables to the table of 10's.

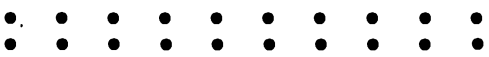
10. Put in the missing numbers:

7	?	?	8	6	?	3	4	?
?	6	7	?	?	4	?	?	9
9	11	15	12	9	10	10	7	11

11. *Add:*

8	6	7	8	5	4	8	4	6
7	9	7	6	5	9	5	7	6

12.	6 + ? = 15	15 − ? = 6	15 − 6 = ?
13.	14 − ? = 7	14 − 7 = ?	13 − 8 = ?



1. Count these dots by 2's; thus: Two, four, six, etc.
2. See how much farther you can count by 2's.

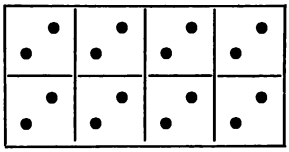
NOTE. — It is well to let children test their powers in counting, adding, etc., in order to cultivate a sense of accomplishment, a realization of strength, a joy in independent effort and investigation. The course of study represents a minimum requirement. And yet, some of the most valuable exercises reach far beyond that minimum. For example, a child may count by fives to 100 as easily as to twenty. After children have learned to write numbers to 100, a mere suggestion is sufficient to carry them through numbers of three and four places. They should be encouraged to move ahead like an automobile, — by their own power, — and not like a freight car which must always be drawn or pushed.

3. How many dots? How many twos? Three twos are how many? How many twos are there in six?

How many dots? How many threes? Two threes are how many? How many threes are there in six?

In the same way find how many are 4 twos, how many 2's in 8, and how many 4's in 8.

4. Read 15, 37, 58, 34, 96, 82, 67, 77, 17, 83, 39, 51.
5. Write in figures: ninety-one, twenty-seven, sixty-eight, ninety-three, thirty-five, fifty-three.



6. Write the number of squares in this drawing.
7. Count the dots by 2's. Write the number of dots.

1. Make a table of 2's, counting by 2's to find the amount of each column; thus: 2, 4; 2, 4, 6; 2, 4, 6, 8; etc.

	2	2	2	2	2	2	2	2	2
	2	2	2	2	2	2	2	2	2
Two 2's are 4		2	2	2	2	2	2	2	2
Three 2's are 6			2	2	2	2	2	2	2
Four 2's are 8				2	2	2	2	2	2
Five 2's are 10					2	2	2	2	2
Six 2's are 12						2	2	2	2
Seven 2's are 14							2	2	2
Eight 2's are 16								2	2
Nine 2's are 18									2
Ten 2's are 20									

2. 4 twos are 8, may be written $4 \times 2 = 8$. It is read, "4 times 2 are 8."

Read the following, putting in the answers:

$1 \times 2 = ?$	$6 \times 2 = ?$
$2 \times 2 = ?$	$7 \times 2 = ?$
$3 \times 2 = ?$	$8 \times 2 = ?$
$4 \times 2 = ?$	$9 \times 2 = ?$
$5 \times 2 = ?$	$10 \times 2 = ?$

3. Looking at the table above, tell how many 2's there are in 4; in 6; in 8; etc. to 20.

4. "There are 2 twos in 4," may be written $4 \div 2 = 2$. It is then read, "4 divided by 2 are 2."

Copy the following, putting in the missing numbers:

$? \div 2 = 1$ $? \div 2 = 3$ $? \div 2 = 5$ $? \div 2 = 7$

$? \div 2 = 2$ $? \div 2 = 4$ $? \div 2 = 6$ Can you go farther?

• • • • • 1. How many dots? How many 2's?
• • • • • How many dots in the upper line? In the lower line? How many 5's are there? Two 5's are how many? Five 2's are how many?

$5 \times 2 = ?$ $\quad 2 \times 5 = ?$
$10 \div 2 = ?$ $\quad 10 \div 5 = ?$

2. Similarly teach:

$6 \times 2 = 12$ $\quad 2 \times 6 = 12$
$12 \div 2 = 6$ $\quad 12 \div 6 = 2$
$7 \times 2 = 14$ $\quad 2 \times 7 = 14$
$14 \div 2 = 7$ $\quad 14 \div 7 = 2$

3. How many young birds are there in this nest? If the mother bird brings one worm to each one, how many worms must she bring? If she brings two worms to each bird, how many worms must she bring? If there were 5 birds in the nest, how many worms would be needed to give each bird two worms?

4. Henry planted seven hills of potatoes, putting two pieces of potato in each hill. How many pieces of potato did he use?

5. Six two-cent stamps cost how many cents?

6. Seven rabbits have how many ears?

7. Six boys have how many thumbs?

8. Twelve eggs will serve how many people if each person has two eggs?

9. Two oranges at 5 cents apiece cost how much?

Keep **pint** and **quart measures** before pupils.

What is the first measure?

For what do we use it?

What is the second measure?

For what do we use it? Which is the larger?

Fill the pint measure with water. Pour it into the quart measure. Do it again. How much more will the quart measure hold? How many pints does the quart measure hold?

1. How many pints make a quart?

2. The quart measure will fill the pint measure how many times?

3. Two quarts are how many pints? Measure and prove it. Three quarts? Four, five, six quarts?

4. How many quarts are there in 4 pt.? Six, eight, ten, twelve pints? NOTE. — *pt.* stands for *pint* or *pints.*

5. Mary bought 3 quarts of milk. How many pints did she buy?

6. Alice filled a pint measure four times from a pitcher of water. How many times would the pitcher of water fill a quart measure? Why?

7. How many pint bottles can be filled from five quarts of cream?

8. How many quart cans will 12 pints of sirup fill?

9. How many pints of milk will 3 pint bottles and one quart bottle hold?

10. Julia melted some maple sugar and made six pints of sirup. How many quarts of sirup did she make?

11. Our janitor made four quarts of ink. How many pint bottles will it fill?

1. When we say, "3 and 2 are 5," we *add* 3 and 2.

Add:

2	2	7	6	4	7	4	8	7
3	5	3	5	4	2	6	2	6

2. When we say 9 less 5 are 4, we *subtract* 5 from 9.

Subtract:

9	7	12	13	12	15	10	7	8
5	4	7	5	2	6	4	2	3

3. *Add:*

4	6	3	2	2	7	2	1	2	5
1	1	2	2	3	2	3	4	2	1
3	1	1	2	2	1	3	3	3	2

4. *Subtract:*

6	4	7	5	14	8	8	4	5	8
2	2	3	2	4	5	7	3	3	2

5. Count by 2's from 1 to 11.

6. Count by 2's from 2 to 14.

7. Count by 2's from 10 to 2.

8. Count by 2's from 11 to 1.

9. If we work six days in a week, how many days do we rest?

10. Two dogs have how many feet?

11. A dime is made of silver. It is the same as ten cents. (Show this with coins.)

A dime less two cents is how many cents?

12. How many oranges are there in a dozen?

13. Find the cost of 3 oranges at 2 cents apiece.

In this game, each child has been given a number. The teacher gives a question (6 and 3, 12 less 5, 4 times 2, etc.), and tosses the ball. The child whose number answers the question catches the ball and gives his number. The game may be varied in many ways.

1. Count to 12 by threes.

2.	$6 + ? = 8$	$9 - ? = 3$	$7 + 2 = ?$
3.	$7 + ? = 9$	$9 - ? = 7$	$6 + 3 = ?$
4.	$2 + ? = 5$	$6 - ? = 2$	$7 - 2 = ?$
5.	$5 + ? = 9$	$10 - ? = 4$	$? - 4 = 6$
6.	$3 + ? = 6$	$7 - ? = 2$	$? + 3 = 6$
7.	$5 + ? = 9$	$3 + ? = 9$	$5 + ? = 7$
8.	$? - 6 = 4$	$7 - 5 = ?$	$6 - ? = 4$

9. Name the days of the week.

10. Which is the first day? The fourth? The seventh?

11. How many working days are there in two weeks?

12. How many days are 2 days less than a week?

13. A week and 3 days are how many days?

14. There were 7 apples in a basket. Frank took 1 in each hand. How many were left?

15. Eight boys went to the store for milk. Each bought a pint. How many quarts did they buy?

TO THE TEACHER. — Dramatize questions 9–13. Let seven children be the seven days. Make other questions.

TEACHERS HAVE FOUND THESE USEFUL

1. Relay race:

Divide blackboard into as many spaces as there are rows of desks. In each space place simple number combinations in addition, subtraction, or multiplication.

$3 \times 3 =$	$5 \times 2 =$
$2 \times 4 =$	$2 \times 9 =$
$6 \times 3 =$	$3 \times 4 =$

Give crayon to leaders in each row. Leader writes first result. hands crayon to next, who writes next and corrects any error, and so on. The row having all correct in the shortest time wins the race.

2. Write number combinations each on a separate card. Give each child 2 or more cards. Class stands in circle. Children pretend the cards are stones, and as each problem is given, the stone is tossed into the brook. Teacher tells correct answer to any one failing, and that one holds the same card until his turn comes again. The child holding the last card must gather the stones and put them on the bank to dry.

Other imaginative games may be played with the same cards.

3. For "seat work" make individual charts, two for each pupil. Cut up one and put it into an envelop. Lay the "cut up" one to match the other one.

4. Have a "number match." See who can stand the longest without missing.

5. Play "Pop-corn." That is, have pupils give just the answer without the least hesitation, one right after the other. Those who hesitate must leave the popper.

6. Have children form circle. Pass around cards $4 + 3$; 2×6; or $10 - 3$. First child shows his card to child at his right. This child gives result quickly. Shows his card to the next, and so on around the circle. If child is not able to give result quickly and correctly, he must go into center of circle.

7. For reviewing a multiplication table make a circle of 12 children. Give each a number (1 to 12), then place a child in the center whose number is 3 (should you be reviewing that table). This child must not know the numbers of the other children. When number 3 points

to number 7, seven answers "21"; then 3 replies "7," knowing then the other number; and so on around the circle. Many variations of this game are possible.

8. Keep before the class the cards on which are dots showing combinations. For a while, child counts. After a time, he sees as a whole. Then, later, a glance in the right direction is enough, and the card is of no more use.

9. Use number card for each child, on which is recorded each number of which he can give all combinations.

10. "Spelling up" or "spelling down" with number combinations.

11. Present the combinations of a number, say 10, by taking 10 objects, books, children, pencils, or anything convenient. Have them counted carefully by each pupil, then take away and count those remaining, telling in sentences what has been done; as, "Mary gave John one of her 10 pencils and she has 9 left, for 9 and 1 are 10." Continue in this way, one at a time, until all are in John's hand. After they all see it clearly, they take their numbers and sticks and each one makes the table of 10 on his desk, using the sticks for objects. This is good "seat work."

12. For drill in combinations:

a. Children form circle. Teacher gives combinations. One who misses goes to center. If he can give answer first, he exchanges places with the one whom he beat. On principle of "drop the handkerchief."

b. Teacher thinks of number — say 15. Children in turn guess the combination she has in mind.

13. Prepare a number of cards 3 × 9 inches. Paste one large figure at the top of each one. As the cards are shown, the children are to supply the number that will make 12, or any other desired number. Double each one as it is shown. Give one half of each number.

Add 5 (or any number desired) to each one as it is shown.

14. Make steps leading to a house and place combinations on steps. Let children race up and down.

15. Use of cards on which combinations are printed.

a. The one answering first receives the card. See who can get the most. Discourage guessing.

b. Let each one have a turn to answer and keep the card if he answers correctly.

16. Place combinations on ladder. Play fireman.

a. Let children name answers (climb). If they miss, they fall down.

b. Run races up or down. Change combinations after every third or fourth trial.

17. Use chart or board. Teacher call on some one to answer as she points to the combination. When a mistake is made, the first to answer correctly has a turn. Game is to see who can catch the most people. Give each one a chance.

18. Use toy money. Attach it to objects or figures to indicate the relative values. Make problems involving buying or selling such articles.

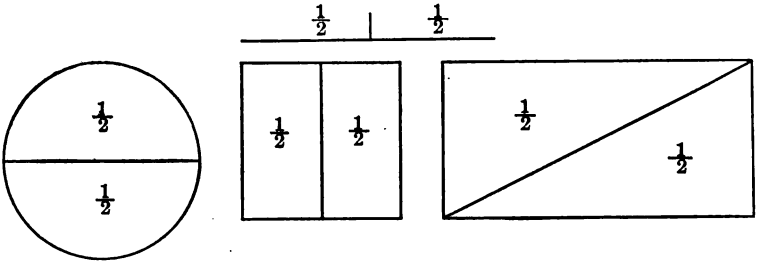
19. To assist in committing the addition and subtraction tables, have copied in rather large figures 10 or 12 combinations, taking about 12 sheets to cover the entire tables. Number the sheets 1, 2, 3, 4, etc. Have from 6 to 10 copies of each number, so you can put a separate sheet into each child's hand. When he can read off number 1 quickly and correctly, it is checked off against his name and he proceeds immediately to number 2, and so on through the 12 sheets. Children love to go on to the next sheet, and it insures independent work. No two children need necessarily be working on same sheet.

20. "I am thinking." One child standing before the class says "I am thinking of two numbers whose sum is 9." The other children, one at a time, say, "Are they 6 and 3?" "Are they 5 and 4?" etc. The one who first names the combination in the first child's mind exchanges places with the first child. All four fundamental operations may be used in this game.

21. Keep in a conspicuous place, on the blackboard or elsewhere, tables of all combinations that children are using so that they may refer to them while doing seat work. By this means, the temptation to count on the fingers will be removed, the habit of guessing will not be formed, and, by constant use, pupils will learn the correct results.

22. Use cards with numbers printed on them. A child draws one. The number is 6 and he says: "I have a number. 3 and 3 make it. What is it?" (Teacher may say, "What else makes 6?")

23. One child names a number. The next adds to it or subtracts from it another number, and the next child states the result. This should be continued rapidly. The one who fails, or is not ready, stands.



1. Draw a line. Cut it into two equal parts. What is one part?

2. Fold your paper once in the middle. It is what part as large as before you folded it?

3. Point to one half of the circle at the top of this page.

4. Point to one half of the square at the top of this page.

5. One half of 4 cents is how many cents? (Picture.)

6. Take six counters. Find one half of them. One half of six is how many? (Do this with beans, lentils, crayons, pennies, etc.)

7. There are 12 apples in a dozen. Half a dozen apples at a cent each cost how much?

8. George bought a half dozen apples and gave 4 to Rose. How many had he left?

9. 4 days and how many days make a week?

10. How many cents in a half dime?

11.

2	4	3	2	6	3	2	10	12	11
× 3	× 2	× 3	× 5	× 2	× 4	× 2	− 3	− 6	− 5

1. Make six marks.
Group them by 2's; thus: // // //
How many 2's in 6?
Group them like this: /// ///
How many 3's are there in 6?

2. Do the same with 8, 10, 12, 14, 16, 18, 20.

3. *Add:*

4	5	7	2	8	2	2	10
2	2	2	4	2	11	13	2

4. *Subtract:*

5	7	11	9	12	8	6	10
2	2	2	2	2	2	2	2

5. *Multiply:*

3	5	4	8	10	9	2	2
2	2	2	2	2	2	3	5

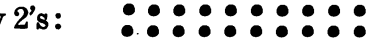
6. *Add:*

2	3	2	2	8	7	3	2
1	4	5	4	1	2	2	1
1	1	1	3	2	3	4	2
2	5	2	1	1	1	1	4

7. *Add:*

6	2	5	3	2	2	5	8
2	3	2	2	2	1	1	1
3	1	7	5	2	3	2	2
2	6	1	2	4	4	3	2

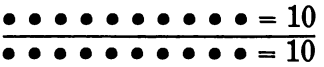
NOTE. — In table exercises (like 3–7 above) if the exercises are written on the blackboard for children to study, the results, also, should be written, so that pupils may study the *correct* number facts. Then in the recitation period let the results be erased and pupils be required to give them from memory.

1. Count these dots by 2's: 
How many 2's are there? How many dots are there in the upper row? In the lower row? Ten dots are what part of 20 dots?

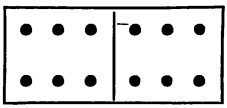
2. Make dots to show two 2's; three 2's; four 2's; five 2's; seven 2's; nine 2's; six 2's; ten 2's.

3. How many 2's are there in 4? In 8? In 10? In 14? In 20? In 16? In 6?

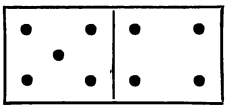
4. Show that there are two 10's in 20; thus:



5. Show how many nines there are in 18.

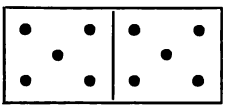


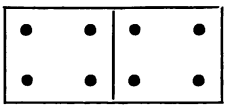
6. This domino shows that $6 + 6 = 12$, that $12 - 6 = 6$, that two 6's = 12, that six 2's = 12, and that $\frac{1}{2}$ of 12 = 6.

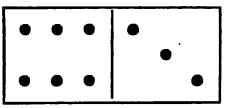


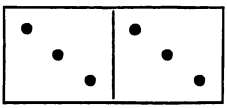
7. This domino shows that $5 + 4 =$ ——, that $9 - 5 =$ ——, and that $9 - 4 =$ ——.

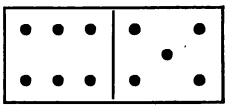
8. Tell what is shown by each of these dominos:





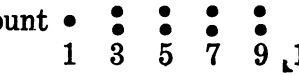






9.

2	4	8	7	5	3	9	10
+ 2	+ 4	+ 8	+ 7	+ 5	+ 3	+ 9	+ 10

1. Count 

2. 9 and 2 are how many?

3. Count $19 + 2 = ?$

4. $29 + 2 = ?$ $39 + 2 = ?$ $49 + 2 = ?$ $59 + 2 = ?$ $69 + 2 = ?$ $79 + 2 = ?$ $89 + 2 = ?$ $99 + 2 = ?$

5. Count by 2's from 1 to 99.

6. Count by 2's from 99 to 1.

7. John had 7 marbles and bought 6 more. How many had he then? Show by a picture.

8. $7 + 6 = ?$ $6 + 7 = ?$ $13 - 6 = ?$ $13 - 7 = ?$

9. Arthur paid 8 cents for a tablet and 6 cents for pens. What did both cost? 8 and 6 are how many?

10. William had 14 cents. He paid 10 cents for a quart of milk. How many cents had he left? (Picture.)

11. A boy found 14 eggs in a nest and sold a dozen. How many were left? Show by a picture.

12. *Add:*

6	2	6	6	2	2	6	2
2	3	2	3	2	2	4	3
3	5	3	1	7	3	1	1
2	2	2	1	1	2	2	2
1	1	1	3	5	8	1	4

13. *Subtract:*

4	5	8	11	13	9	8	10	12	13
2	3	5	6	7	3	2	5	7	6

• • • 1. How many dots are there in each row?
• • • How many in all?
• • • Three 3's are how many? $3 \times 3 = ?$

2. Three oranges at 3 cents apiece cost how much?

3. This is Clara's rose bed. How many bushes are there in one of the shorter rows? How many of those rows? How many bushes in all? Four threes are how many? $4 \times 3 = ?$

If Clara cuts 3 roses from each bush, how many roses will she cut from 3 bushes?

4. How many bushes in each of the longer rows? How many of these rows? Three 4's are how many? $3 \times 4 = ?$ $12 \div 3 = ?$ $12 \div 4 = ?$

5. How many cents will John earn in 4 days if he earns 3 cents each day? How many cents will he earn in 3 days if he earns 4 cents each day?

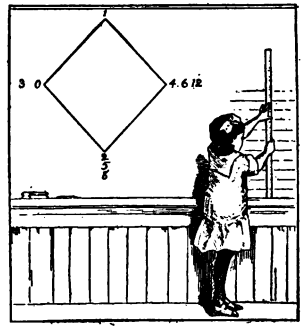
6. How many 3's are there in 9? In 12? How many 4's are there in 12?

(In a similar way, teach $5 \times 3 = 15$; $3 \times 5 = 15$; $15 \div 3 = 5$; $15 \div 5 = 3$.)

7. Make a table of 3's to 15; thus:

$$\begin{array}{rccccc} & 3 & 3 & 3 & 3 & 3 \\ 1 \times 3 = & \overline{3} & 3 & 3 & 3 & 3 \\ 2 \times 3 = & \overline{6} & 3 & 3 & 3 & \\ 3 \times 3 = & \overline{9} & 3 & 3 & & \\ 4 \times 3 = & \overline{12} & 3 & & & \\ 5 \times 3 = & \overline{15} & & & & \end{array}$$

NOTE. — If possible, let each pupil be provided with a yardstick. At least have several. Let pupils have much practice in estimating and measuring.



1. Draw a line 1 yard long on the blackboard.

2. Find something a yard long or wide in the room.

3. How long do you think the schoolroom is? How wide? Measure it. Find something 1 yard high.

4. Name some things that are always measured by the yard.

5. Without the yardstick draw a line one yard long. Measure and correct it. A line 2 yards long.

6. How long do you think the blackboard is? Measure it, and see how nearly correct your estimate is.

7. Hold your hands 1 yd. apart. Hold them 1 yd. above the floor. NOTE. — *yd.* stands for *yard* or *yards.*

8. What will 2 yd. of ribbon cost at 7 cents a yard?

9. How many yards of ribbon will 20 cents buy at 2 cents a yard?

10. Draw a line 1 yd. long. Divide it into 3 equal parts. What is one of these parts?

11. Hold your hands one foot apart. Draw a line 1 foot long. Hold your hand one foot above your desk.

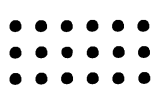
12. How many feet high are you?

13. Without a rule draw a line 2 feet long. Measure and correct it. Do the same with lines 3, 4, 5, and 6 feet long.

1. Add the 3's in each column.
   Six 3's are how many?
   Seven 3's are how many?
   Five 3's are how many?
   Four 3's are how many?
   How many 3's are there in 21?
   In 18? In 15? In 12?

3	3
3	3
3	3
3	3
3	3
3	3
18	3
	21

2. How many dots in a row up and down? How many rows up and down? How many dots in all? $6 \times 3 = ?$



3. How many dots in a row from left to right? How many rows? How many dots in all? $6 \times 3 = ?$ $18 \div 3 = ?$ $18 \div 6 = ?$

4. In the same way show that $7 \times 3 = 21$; $3 \times 7 = 21$; $21 \div 3 = 7$; $21 \div 7 = 3$.

5. Beginning with 3, count by 3's as far as you can.

6. Mildred's father is 6 ft. tall. Mildred is one half as tall as her father. How tall is Mildred? How many yards tall is Mildred's father? How many yards tall is Mildred?

7. When a pound of cheese costs 20 cents, what will $\frac{1}{2}$ of a pound cost?

8. Robert earned 10 cents sprinkling a lawn. He gave half of the money to his sister. How many cents did he give away?

9. A pint is what part of a quart? When a quart of vinegar costs 8 cents, how much shall I pay for a pint of vinegar?

1. How many feet are there in 2 yd.? In 3 yd.? In 4 yd.? In 5 yd.?

NOTE. — *ft.* stands for *foot* or *feet.*

2. How many yards in 15 ft.?

3. A flag 6 yd. long is how many feet long?

4. A flag 6 ft. long is how many yards long?

5. Count by 3's from 0 to 21 and back to 0.

6. Two 3's are how many? Four threes? Seven 3's? Six 3's? Three 3's? Five 3's?

7. Frank found in his garden a corn stalk 6 ft. tall. How many yards tall was it?

8. Seven yards of cloth are how many feet long?

9. $7 + 3 = ?$ $9 + 3 = ?$ $12 + 3 = ?$ $13 + 3 = ?$

10. $5 - 3 = ?$ $11 - 3 = ?$ $8 - 3 = ?$ $9 - 3 = ?$

11. *Add:*

4	4	3	4	2	3	4	5	7
3	6	5	7	1	4	6	1	2
5	3	3	3	3	2	3	2	3
3	3	7	2	4	1	1	3	1
				3	1	2	1	4

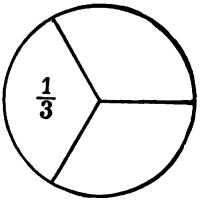
12. *Subtract:*

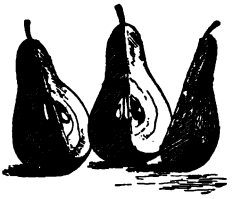
13	12	15	16	11	11	12	10	9	10
7	6	3	4	9	2	3	7	5	3

13. *Multiply:*

8	3	4	9	10	3	2	7
2	5	3	2	2	3	4	3

14. *Divide:* $2\overline{)6}$; $3\overline{)6}$; $4\overline{)12}$; $3\overline{)12}$; $3\overline{)15}$; $8\overline{)16}$.





1. Divide a yard into feet. One foot is what part of a yard? One third of 3 ft. is how many feet?

2. One third of 6 cents is how many cents?

3. How many 3's in 6? $\frac{1}{2}$ of 6 = ? How many 2's in 6? $\frac{1}{3}$ of 6 = ?

4. $\frac{1}{3}$ of 9 marbles is how many marbles?

5. $\frac{1}{3}$ of 3 yd. is how many yards?

6. Three 3's are how many?

7. $\frac{1}{3}$ of 9 dots is how many dots?

8. How many 3's in 9?

9. Four times 3 are how many?

10. How many 3's in 12? $\frac{1}{3}$ of 12 = ?

11. A ribbon 12 ft. long is how many yards long?

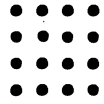
12. Five 3's are how many? Show this by a picture.

13. $\frac{1}{3}$ of 15 = ? How many 3's in 15?

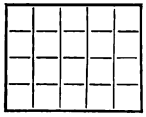
14. Six 3's are how many? $\frac{1}{3}$ of 18 = ? How many 3's in 18? Show this with dots.

15. An orchard has 3 rows of trees with 8 trees in a row. How many trees in the orchard? Make a picture of it.

1. How many dots in each row? How many rows each way? How many dots in all? Four 4's are how many? How many 4's are there in 16? $4 \times 4 = ?$ $? \times 4 = 16$ $4 \times ? = 16$ $16 \div 4 = ?$ $16 \div ? = 4$



2. In this figure there are how many squares in each row up and down? How many rows? How many squares in all? Five times 4 are how many? How many 4's are there in 20? $20 \div 4 = ?$



3. How many squares are there in each row from left to right? How many rows? How many squares in all? 4 times 5 are how many? How many 5's are there in 20? $4 \times 5 = ?$ $20 \div 5 = ?$

4. Write six 4's in a column. Add them. Six 4's are how many? $4 \times 6 = ?$ $24 \div 4 = ?$ $24 \div 6 = ?$

5. Make 6 rows of squares with 4 squares in each row. What does this drawing show?

6. Count by 4's as far as you can.

7. *Add:*

4	3	5	4	6	8	4	5	4
2	4	4	7	4	4	9	4	4

8. *Subtract:*

14	8	13	9	15	11	8	7	6
4	4	4	4	4	4	4	4	4

9. *Multiply:*

4	4	4	4	4	5	2	6	3
5	3	2	4	6	4	4	4	4

Keep the measures before the class, requiring children to use them.

1. What measures are these? For what is the quart measure used? For what is the gallon measure used?

2. Fill the quart measure with water. Pour it into the gallon measure. Repeat till the gallon measure is full. How many times did you empty the quart measure? How many quarts make a gallon (*gal.*)? Write on the blackboard what you have learned.

3. How many quarts in 2 gallons? In 3 gallons? In 6 gallons? In 5 gallons? In 4 gallons?

4. How many pints in 1 gallon? In 2 gallons?

5. Two quarts of milk cost how much at 10 cents a quart?

6. Two quarts were spilled from a gallon of water. How much remained?

7. What must I pay for a gallon of vinegar at 6 cents a quart?

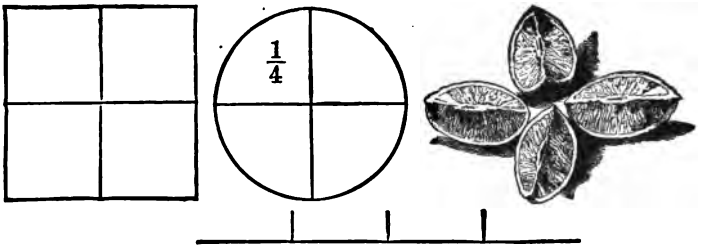
8. Eight quarts are equal to how many gallons? 16 qt.? 24 qt.?

9. A pint of milk will fill two glasses. How many glasses will a quart of milk fill?

10. $\frac{1}{2}$ of 4 qt. is how many quarts? How many quarts in a half gallon?

11. Count by 3's from 1 to 37; from 2 to 38.

12. Count by 2's from 0 to 50 and back; from 1 to 51 and back.



1. How many fourths are there in the square? In the line? In the circle? In the orange?

2. Draw a foot line and divide it into four equal parts. What is each part called?

3. One quart is what part of a gallon?

4. One fourth of 8 is how many? ⁘ | ⁘ | ⁘ | ⁘

5. Show with dots $\frac{1}{4}$ of 12; of 20; of 16.

6. How many 3's in 12? How many 4's in 12?

7. How many 4's in 20? How many 5's in 20?

8. How many are three 4's? Four 5's?

9. If a pound of candy costs 20 cents, what does $\frac{1}{4}$ of a pound cost?

10. Fold a sheet of paper so that it will be $\frac{1}{2}$ as large as it is. Fold it again so that it will be $\frac{1}{4}$ as large.

NOTE. — Enlarge and fix the idea of *fourth* by having papers cut in various forms, and then cut or folded into fourths.

11. Twelve boys were on the playground. $\frac{1}{4}$ of them went home. How many boys went home? How many were left?

12. Harry had 15 marbles. He has 7 now. How many did he lose?

13. How many shoes do 6 horses need?

1. Count by 5's to 50 and back; from 1 to 36 and back.

2. A nickel is equal to a half dime. Two nickels are the same as how many cents?

3. Three fives are how many? Seven fives?

4. $5 + 4 = ?$ $4 + 5 = ?$ $9 - 4 = ?$ $9 - 5 = ?$

5. $5 + 5 = ?$ $10 - ? = 5$ $6 + 5 = ?$

6. Two fives = ? Four 5's = ? $7 + 2 = ?$ $6 + 6 = ?$ $5 + 5 = ?$ $9 + 2 = ?$ $10 + 2 = ?$

7. How many school days are there in one week? Three weeks? Four weeks? Six weeks? Five weeks?

8. How many working days in 4 weeks? In 1 week? In 3 weeks? In 2 weeks?

9. How do you find $\frac{1}{2}$ of anything? $\frac{1}{3}$? $\frac{1}{4}$? $\frac{1}{5}$?

10. Draw a line and divide it into 5 equal parts. What is one of these parts?

11. What is $\frac{1}{5}$ of 10? Of 20? Of 25? Of 15?

12. Count by 3's from 1 to 37; from 2 to 35.

13. Find $\frac{1}{2}$ of 18; $\frac{1}{3}$ of 6; $\frac{1}{4}$ of 12; $\frac{1}{5}$ of 15.

14. Find $\frac{1}{2}$ of 24; $\frac{1}{3}$ of 12; $\frac{1}{4}$ of 16; $\frac{1}{3}$ of 15.

15. How many cents had Dick when he had earned 5 cents and his father had given him a nickel?

16. Nina's bank contained 13 cents and she took out a half dime. How much remained?

17. Jack had 3 cents. How much more did he need to buy a 10-cent ball?

18. $9+5=?$ $10+5=?$ $12+5=?$ $11+5=?$

1. With a rule, draw a line one foot long. Divide it into 12 equal parts. What is one of these parts? How many inches make one foot?

NOTE. — *in.* stands for *inch* or *inches.*

2. Divide the foot line into halves. How many inches in one half of a foot?

3. Divide the foot line into thirds. How many inches are $\frac{1}{3}$ of a foot? $\frac{1}{3}$ of 12 inches is how many inches? Four is what part of 12? How many 4's in 12?

4. Divide the foot line into 4 equal parts. What part of a foot is one of these equal parts? How many inches in $\frac{1}{4}$ of a foot? How many 3's in 12? What part of 12 inches is 3 inches?

5. How many inches in 2 ft.? $2 \times 12 = ?$

6. A foot and 2 in. are how many inches?

7. A foot and 3 in. are how many inches? A foot less 3 in.? Hold your hands 3 in. apart; 6 in.; 10 in.

8. How many inches wide do you think your desk is? Measure it and see.

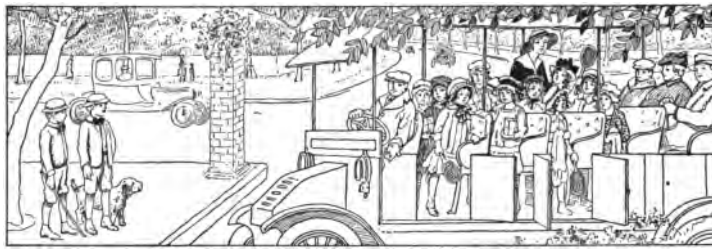
NOTE. — Have much estimating and measuring to fix ideas.

9. A chalk box is 8 in. long and 4 in. wide. How many inches of string would reach around it?

10. How many inches around an inch square? A 2-inch square? A 3-inch square? A 4-inch square? A 6-inch square? Draw these squares.

11. How many feet in 24 inches? 12 inches are what part of 24 inches?

12. Count by 3's to 36. How many 3's in 36?



1. These 11 girls and their teacher are going to the park for a picnic. Each seat in the auto-car holds four people. How many seats will they need?

2. Count by fours and find how many people can be seated in six seats.

3. The fare is five cents. How many cents will the conductor collect from the four people in one seat?

4. How many persons will 4 seats hold?

5. At one corner six more girls join the party, and at another corner two more. How many girls are there in all?

6. How many cents will six girls pay?

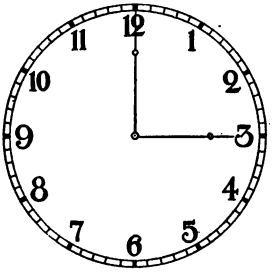
7. How much money must Helen and Cora have, to pay their fares to the park and back?

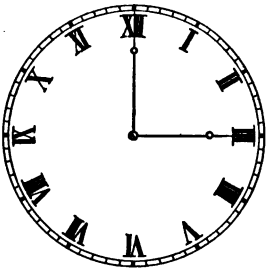
8. The park is four miles from the starting place. The car makes the trip in 24 minutes. It requires how many minutes to travel a mile?

9. How many miles would the car go in 18 minutes?

10. Ruby has twenty-five cents. If she pays her carfare out of it, how much money has she left?

11. If Ruby can buy two buns for a nickel, how many can she buy for ten cents?





NOTE. — Cut two boards eight inches square. On each, paste a card of the same size as the board. Draw clock faces like these. Cut the hands from sheet copper, brass, zinc, or tin, or from heavy cardboard. Fasten them at the center by driving a tack or small nail through them. The hands may then be moved to point anywhere on the dial. Begin with the simplest exercises in telling time. Teach Roman numerals incidentally.

1. Which is the hour hand?
2. To what hour does it point?
3. At what time of day and night does it reach 12?
4. What letters mean 2, 3, 4, 5, 6, 8, 9, 10, 12?
5. Move the hour hand to one o'clock, two o'clock, etc.
6. Move the hour hand to the time for school to begin.
7. Move it to the time for school to close.
8. How many minute spaces between 12 and 1?
9. Count the minute spaces by 5's, moving the minute hand as you count.
10. Move the hands to show twelve o'clock, one o'clock, two o'clock, etc.
11. To what letters does the minute hand point, at 5, 10, 20, 25 minutes past the hour?

These are some of the prices in this store:

Shoe laces (pair)	5¢	Looking glass	10¢
Ball of yarn	5¢	Knife	10¢
Package of paper napkins	5¢	Hatchet	10¢
Bag of mints	10¢	Toy tennis racquet	10¢
Box of candles	10¢	Bottle of ink	5¢
Bathing cap	10¢	8 boxes of matches	5¢
Card of buttons	5¢	Baseball	10¢
Two spools of thread	5¢	Mouse trap	5¢
Rubber ball	5¢	Screw driver	5¢
Bat	10¢	Glass vase	10¢

Find the cost of:

1. Two pairs of shoe laces.
2. Two balls of yarn and a box of candles.
3. Two cards of buttons and two spools of thread.
4. A bat and a baseball.
5. Four packages of paper napkins.
6. A looking glass and two bottles of ink.
7. Three mouse traps and a screw driver.
8. Three bags of mints.
9. A knife, a hatchet, and a rubber ball.
10. A bathing cap and a toy tennis racquet.
11. Eight boxes of matches and a glass vase.

1. Count by 6's from 0 to 18; from 2 to 20; from 3 to 21; from 4 to 22.

2. How many working days in 2 weeks? In 3 weeks?

3. Count by 6's from 18 to 0.

4. Julia bought a tablet for 6 cents. She gave the clerk a dime. How much change should she receive?

5. Sarah is 12 years old. Mary is 6. What is the difference between their ages?

6. If Grace is 6 years older than Sarah, how old is Grace?

7. What must be paid for a slate worth a dime and a picture worth 6 cents?

8. How many papers must Frank sell at 2 cents apiece to get 12 cents?

9. Eleven marbles and six marbles are how many?

10. If you can buy 6 marbles for a cent, how many can you buy for 3 cents?

11. Hubert found 6 brown eggs and two times as many white ones. How many white eggs did he find?

12. Six inches are what part of a foot? 3 inches?

13. Six is $\frac{1}{2}$ of what? $\frac{1}{3}$ of what? $\frac{1}{4}$ of what?

14. *Add:*

6	6	6	6	6	2	6	6	6	2
6	6	6	6	2	6	5	1	2	2
	6	6	6	6	6	4	5	3	7
		6	6	1	2	3	4	6	6
			6	6	3	2	2	2	1

1. Count by 7's from 0 to 28; from 28 to 0.

2. *Add:*

7	7	7	7	5	7	6	7	4	1
7	7	7	3	2	5	2	3	7	9
	7	7	4	6	7	3	7	2	3
		7	2	7	3	7	1	7	7

3. *Multiply:*

7	7	3	5	3	2	4
2	3	6	4	5	7	4

4. *Subtract:*

7	9	11	14	18	16	12	13	10	15
7	7	7	7	7	7	7	7	7	7

5. $7\overline{)14}$ $7\overline{)21}$ $7\overline{)7}$ $3\overline{)15}$ $3\overline{)18}$ $6\overline{)18}$ $4\overline{)20}$

6. *Add:*

7	2	2	7	7	7	6	7	5	7
7	2	2	3	4	5	3	3	7	6
4	7	7	3	3	3	2	3	2	5
3	2	6	6	4	2	7	3	2	4

7. Count by 7's from 1 to 29; from 5 to 26.

8. $17 - 7 = ?$ $19 - 7 = ?$ $19 - 12 = ?$ $7 + ? = 14$

9. $\frac{1}{2}$ of 14 marbles is how many marbles?

10. 7 is $\frac{1}{3}$ of what number? $\frac{1}{4}$ of what number?

11. How many days are there in 2 weeks? In 3 weeks? A week is what part of 21 days?

1. Dennis earned 15 cents. He bought two oranges for 6 cents, and put 9 cents in his bank. How much money had he left?

2. 14 oranges are how many more than a dozen?

3. Harry visited his uncle, 15 miles from Harry's home. He rode 12 miles and walked the rest of the way. How far did he walk?

4. Will had 16 marbles and lost 4. How many had he left? $16 - 4 = ?$ $14 - 12 = ?$

5. 12 cents and a half dime are how many cents?

6. A half dozen cakes are how many cakes? How many are a dozen and a half dozen? $12 + 6 = ?$

7. Jennie had 18 cents. She bought a pad for 8 cents. How many cents had she left? $18 - 8 = ?$ $10 + 8 = ?$ $18 - 10 = ?$

8. To-day is the 11th day of the month. A week from to-day is what day of the month? $11 + 7 = ?$ $18 - 11 = ?$ $18 - 7 = ?$

9. Ralph has 17 chickens; 9 are white and the rest are brown. How many are brown? $17 - 9 = ?$

10. *Add:*

1	0	3	6	3	2	5	6
5	2	2	5	4	4	5	2
3	1	7	0	5	6	5	0
6	9	2	5	2	3	5	6

11. *Add and subtract:*

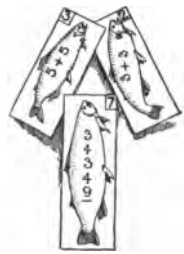
17	16	17	13	18	15	13
9	7	9	0	10	9	7

These children are fishing. They take turns in casting. If a child can answer correctly the combination which he draws, he keeps the fish. (He "lands" it.) If his answer is wrong, he must put it back. (It "slips off the hook.") The one who lands the most fish wins. A figure may be placed in the corner of the card to tell how much the fish counts, large fish (hard combinations) counting more than small ones. Each pupil reads the combination aloud and answers it when he draws.

Here are some of the fish:

RACHEL'S CATCH.

SAM'S CATCH.



ARTHUR'S CATCH.

1. What is Rachel's score?
2. What is Sam's score?
3. What is Arthur's score?

NOTE. — Let pupils assist in making this material. It is good "hand work."

NOTE. — These tables contain combinations that require most repetition.

Copy them on the blackboard and go through them daily as a rapid drill exercise. Change the order occasionally. In using the tables, vary the order, sometimes going across and sometimes up and down. Teacher use the pointer sometimes. Occasionally let pupils take turns in pointing while others answer.

ADDITION DRILL TABLE

9	7	6	5	5	9	7	6	3	7
2	8	8	4	9	4	5	9	8	7
6	3	7	9	4	6	8	9	4	2
4	9	3	8	3	6	2	0	5	6
2	8	4	6	0	7	3	4	9	8
5	5	4	7	6	9	3	8	9	8
7	4	5	3	2	5	2	6	0	5
4	0	6	2	4	5	7	3	4	3

SUBTRACTION DRILL TABLE

12	18	15	16	16	10	17	9	14	12	13
4	9	7	8	9	6	9	3	9	7	4
15	11	13	11	14	10	12	11	13	11	15
9	8	7	4	7	4	9	5	8	2	8
12	9	12	13	8	7	16	19	17	9	8
6	4	8	2	4	3	7	9	8	6	5
14	15	17	11	13	9	11	10	16	15	10
8	6	7	3	6	5	7	5	6	4	3
11	14	12	13	8	12	16	7	13	14	11
6	5	3	9	3	5	5	4	5	2	9

USED BY TEACHERS IN PRACTICE ON COMBINATIONS

1. (*a*) Class takes an imaginary journey:

8	9	12	6	7	4	12	7
6	7	10	7	8	7	9	8

R.R.

Tell how many people you see at stations along the way.

(*b*) People leave station as soon as the train goes. (Combinations erased; sum stated.)

2. Measurement drill: Pass rulers to pupils in first row. They pass to board and draw a line the length indicated by teacher as 2″, 5″, 3″, 4″, 6″. Require rapid work. Face about when through.

Teacher: "How long is your line and how long would it be if it were two times as long?" *Child:* "My line is 6″ long. If it were 2 times as long, it would be 12″ long." Rulers passed to second row, etc.

3. The children form a circle about the teacher, who stands in the center. As the teacher looks at each child in succession in the circle and gives a number, the child is to supply the number which put with this one will make 14, or any number that is being taught. When the child misses or is too slow, he steps into the ring by the teacher. His object then is to get back into the circle by answering more quickly than the child whose turn it is.

4. On slips of paper write numbers to be added, subtracted, multiplied, or divided, as: $8 + 9 =$ $16 - 3 =$ $5 \times 4 =$ $3)\overline{21} =$. On other slips write results, as: 17, 13, 20, 7. Distribute slips to class. One child goes to the board and writes what is on his slip, as: $16 - 3 =$. The one having the correct answer goes to the board and completes the equation, $16 - 3 = 13$. Another child goes to the board. Suppose he has on his paper 20. He writes 20, and the child having $5 \times 4 =$ goes to the board and writes it before 20.

5. Elevator game, for adding, subtracting, multiplying, or dividing:

6	5	9
4	1	8
16	11	10
4	7	6
14	10	7
7	2	6

Arrange numbers in rows as illustrated. A child as elevator boy gives answers to the row, beginning at the bottom. If the answers are correct, and given easily, he carries his passengers smoothly and quickly up a certain number of stories.

7. Divide the class into two divisions and throw a bean bag first to one side, then to the other, and start counting by 3's or 4's, etc. with the first catch. If a child misses the count or fails to catch the bean bag, he must take his seat. Great interest is shown both in answering correctly and in trying to catch the bean bag.

8.

5	3	7	5	0	5	7	8	6	×	7	4	0	6	8	3	6	5	7
4	0	6	3	8	6	3	5	4		8	5	7	3	7	8	4	8	4

A child starts at each end. The one reaching the center first may cross over and write answers on the other side, thus winning the race.

9. Railroad track:

2
4
10
6
8
1
5
11

Train No. 4.

Start train. Time children.

10. Number children in class from 1 to 12. Each child pins on his or her number. Say, "Yourself × 3" or "Alice × 5" or "John × May." In this way the children are kept alert and interested.

11. To review all combinations taught and maintain interest: Make a set of cards, no two alike, on 3 × 5 cardboard, each card containing six hard combinations. Pass out to class. Child must not look at his card until his turn to recite.

24 − 12 =
22 − 10 =
10 − 6 =
20 − 12 =
13 − 8 =
15 − 7 =

First child reads his card and gives answers. If he makes a mistake, the first child who notices it may take the card and answer it. The children who have the greatest number of cards at the end of the lesson win.

Reward winners by giving them colored stars after their names on the blackboard.

12. Consider the time element in testing pupils individually. Place the figures 0 to 9 in a vertical column in mixed order. Place a figure at the left to be added to or multiplied by each figure in the column. If pupil cannot go through the table thus in 10 or 12 seconds, he needs more drill.

PART THREE. THIRD YEAR

OUTLINE OF THIRD GRADE WORK

Reading and writing numbers of four figures.

Addition and subtraction, oral and written.

Simple one-step problems, applying addition and subtraction of small numbers.

Simple problems in United States money.

Testing addition and subtraction.

The multiplication table to 9×10.

Written multiplication by one figure.

Units of measure.

Simple division by one figure.

Finding any part of a number.

Quick tests.

NOTE 1. — In most schools, this book will be placed in the hands of pupils at the beginning of the third year. In order to accustom children to the use of the printed page in number work, and to bring freshly to their minds the number facts already learned, it is best to commence at the beginning of the book and go rapidly through the exercises of Part One and Part Two.

NOTE 2. — A more strictly topical arrangement of the work will characterize the third and fourth year courses. The first topic is addition. Children at the end of the second year should know the primary addition and subtraction facts. Before they can work with confidence in column addition, they must recognize a certain continuity of those primary facts in combinations involving larger sums. For instance, $9 + 4 = 13$; $19 + 4 = 23$; $29 + 4 = 33$; and so on. The pupil must see that wherever the combination "4 and 9" appears, the right-hand figure of the sum is 3, and the next figure at the left is increased by 1. The child's attention should be called to this fact (and to the corresponding facts in other combinations) repeatedly.

The next eight pages contain material for thorough oral practice in preparation for the written addition which follows.

Teachers are advised to return to this oral practice daily until pupils are able to give results without an instant's hesitation.

Add:

1.	2	12	22	62	**2.**	3	13	23	43
	3	3	3	3		3	3	3	3
3.	4	14	24	44	**4.**	5	15	45	65
	3	3	3	3		3	3	3	3
5.	5	15	25	65	**6.**	7	17	37	77
	2	2	2	2		2	2	2	2
7.	3	3	3	3	**8.**	7	17	27	87
	6	16	26	46		3	3	3	3
9.	4	4	4	4	**10.**	2	12	22	62
	1	11	21	31		4	4	4	4
11.	3	13	23	33	**12.**	4	14	24	64
	4	4	4	4		4	4	4	4
13.	5	15	25	35	**14.**	6	16	86	96
	4	4	4	4		4	4	4	4

15. *Add* 2 *to each of these numbers:*

9, 19, 29, 39, 49, 59, 69, 79, 89

16. *Add these columns downward:*

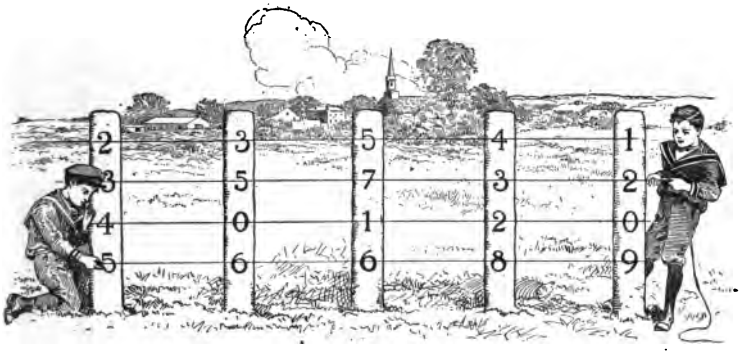
17. 6	**18.** 9	**19.** 7	**20.** 9	**21.** 5	**22.** 6	**23.** 4	**24.** 8
4	9	2	1	5	4	7	8
9	1	9	8	5	6	8	2
2	2	1	1	5	4	2	2
		2	2	4	9	9	5
				2	2		4

Add:

25. 8	18	28	38	48	59	69	79	89
3	3	3	3	3	3	3	3	3

Add:

1.	3	**2.**	3	**3.**	3	**4.**	3	**5.**	3	**6.**	9	**7.**	3	**8.**	3
	7		9		2		3		8		9		2		2
	8		3		8		3		6		9		9		8
	3		1		3		9		3		3		6		9
9.	7	17	27	37				**10.**	4	4	4	4			
	4	4	4	4					8	18	28	48			
11.	4	4	4	4				**12.**	49	69	89	59			
	9	19	29	39					4	4	4	4			
13.	4	**14.**	4	**15.**	3	**16.**	4	**17.**	3	**18.**	3	**19.**	2	**20.**	6
	7		8		4		7		7		9		9		4
	4		2		8		4		5		2		4		4
	6		7		9		3		4		6		5		6
21.	1	11	21	31				**22.**	2	12	5	5			
	5	5	5	5					5	5	22	82			
23.	4	14	24	44				**24.**	5	5	5	5			
	5	5	5	5					5	15	35	95			
25.	3	13	23	53				**26.**	43	93	63	33			
	5	5	5	5					5	5	5	5			
27.	5	5	5	5				**28.**	7	17	37	67			
	6	16	26	86					5	5	5	5			
29.	6	18	28	48				**30.**	9	19	49	39			
	8	5	5	5					5	5	5	5			
31.	5	**32.**	3	**33.**	5	**34.**	2	**35.**	5	**36.**	6	**37.**	5	**38.**	4
	7		4		3		6		9		5		9		9
	3		2		8		9		5		5		5		5
	7		5		9		4		4		5		4		5



"Building a wire fence." Let one pupil add the columns downward and write the sums below (setting the posts in the ground); another add from left to right and write the sums (stringing the wires). Only the stronger ones can string wires. See which can finish first. The number and length of posts may be varied indefinitely.

NOTE. — In adding, do not repeat the numbers. In setting the first post say, "9, 12, 14." In setting the second post say, "11, 14."

Build these fences:

1.
$3 + 4 + 9 + 5 + 3 =$
$5 + 8 + 3 + 0 + 2 =$
$2 + 0 + 1 + 7 + 7 =$
$6 + 7 + 4 + 6 + 1 =$

2.
$5 + 3 + 9 + 7 + 2 =$
$6 + 8 + 1 + 8 + 3 =$
$0 + 4 + 2 + 1 + 4 =$
$7 + 1 + 3 + 4 + 8 =$

3.
$5 + 7 + 5 + 1 =$
$2 + 6 + 1 + 9 =$
$3 + 1 + 2 + 3 =$
$4 + 3 + 8 + 2 =$

4.
$3 + 6 + 0 + 8 + 4 =$
$3 + 5 + 7 + 2 + 1 =$
$4 + 4 + 9 + 1 + 2 =$
$1 + 2 + 1 + 5 + 8 =$

5.
$2 + 6 + 4 + 8 =$
$5 + 1 + 1 + 2 =$
$5 + 5 + 3 + 9 =$
$3 + 2 + 7 + 4 =$

6.
$2 + 5 + 1 + 2 + 9 =$
$3 + 1 + 4 + 8 + 1 =$
$5 + 0 + 7 + 6 + 0 =$
$4 + 8 + 3 + 4 + 8 =$

1.	6	6	6	66	**2.**	2	12	22	82
	1	11	21	51		6	6	6	6
3.	3	13	23	73	**4.**	6	16	26	46
	6	6	6	6		4	4	4	4
5.	6	6	6	6	**6.**	6	16	26	46
	5	15	25	35		6	6	6	6
7.	7	17	27	87	**8.**	37	77	47	57
	6	6	6	6		6	6	6	6

Add:

9.	8	18	28	48	**10.**	9	19	29	49
	6	6	6	6		6	6	6	6
11.	6	5	4	3	**12.**	5	6	5	4
	5	6	5	6		4	5	6	6
	4	4	6	5		6	6	4	3
	3	3	3	6		6	4	6	5
	6	6	4	4		6	6	5	6
13.	1	11	21	31	**14.**	2	12	22	52
	7	7	7	7		7	7	7	7
15.	3	13	23	53	**16.**	4	14	24	44
	7	7	7	7		7	7	7	7
17.	7	7	7	7	**18.**	7	7	7	7
	5	15	25	65		6	16	26	66
19.	7	17	27	37	**20.**	8	18	28	48
	7	7	7	7		7	7	7	7
21.	9	19	29	39	**22.**	69	89	79	59
	7	7	7	7		7	7	7	7

NOTE. — To vary the practice in addition combinations, prepare "flash-cards," 3″ × 6″ in size, each containing two numbers; as:

| 7 27 |, | 4 34 |, | 8 18 |, etc.

As the teacher exposes these cards, one at a time, pupils take turns in adding a certain number (as 5, 7, 3) to both of the numbers shown on the card. Various games may be played. For instance, class may "choose sides" and keep a score of correct and incorrect answers.

PROBLEMS

1. In the fishing game, Fred's fish were numbered 2, 4, 1, 5, and 6. What was his score?

2. Eight pint bottles of milk are the same as how many quart bottles?

3. A foot and two inches are how many inches?

4. Ellen's mother paid her 7 cents a yard for making lace. How much did Ellen receive for 3 yards?

5. How much money is 10 cents, and 5 cents, and 3 cents?

6. How much money is two dimes and five cents?

7. Harlow bought a dozen eggs and broke $\frac{1}{3}$ of them on the way home. How many did he break? How many were not broken?

8. $\frac{1}{2}$ of 12 inches = —— inches.

9. $\frac{1}{3}$ of 18 cents = —— cents.

Add:

1.	1	11	21	31	2	12	22	32	52
	8	8	8	8	8	8	8	8	8
2.	3	13	23	43	53	73	63	83	33
	8	8	8	8	8	8	8	8	8
3.	4	14	24	34	44	64	84	54	74
	8	8	8	8	8	8	8	8	8
4.	8	8	8	8	8	8	8	8	8
	5	15	25	35	45	75	85	65	55
5.	6	16	26	46	36	76	56	66	86
	8	8	8	8	8	8	8	8	8
6.	7	17	27	37	47	87	57	77	67
	8	8	8	8	8	8	8	8	8
7.	8	18	28	38	48	8	8	8	8
	8	8	8	8	8	68	88	78	58
8.	9	19	29	39	49	8	8	8	8
	8	8	8	8	8	79	59	89	69
9.	7	8	8	7	8	7	5	7	8
	4	7	3	6	7	8	8	6	6
	3	6	7	3	6	4	7	4	5
	8	5	8	5	3	6	8	8	7
10.	55	79	45	88	67	49	87	73	34
	8	6	7	5	8	8	7	8	7

Add:

1.	1	11	21	41	2	12	22	32	2
	9	9	9	9	9	9	9	9	9
2.	3	13	23	33	43	73	83	53	63
	9	9	9	9	9	9	9	9	9
3.	4	14	24	34	44	9	9	9	9
	9	9	9	9	9	74	64	84	54
4.	5	15	25	35	45	9	9	9	9
	9	9	9	9	9	64	84	74	54
5.	6	16	26	36	76	86	46	66	56
	9	9	9	9	9	9	9	9	9
6.	9	9	9	9	9	9	9	9	9
	7	17	27	37	47	87	57	77	67
7.	9	9	9	9	9	9	9	9	9
	8	18	28	38	48	78	58	88	68
8.	9	9	9	9	9	9	9	9	9
	9	19	29	39	49	59	89	69	79
9.	9	9	8	5	4	2	9	8	7
	7	3	9	6	9	9	9	8	7
	3	2	7	3	8	7	9	8	7
	2	5	2	7	7	9	9	8	7
	6	9	1	9	6	3	9	8	7
10.	18	37	48	76	89	38	45	94	87
	9	6	9	5	7	8	7	5	6

1. Bertha's reader cost 35 cents and her blank book cost 8 cents. What did they both cost?

2. Dick bought a pound of butter for 48 cents and a box of berries for 8 cents. What did he pay for both?

3. Ethel paid 35 cents for a pair of shears and 9 cents for buttons. What did both cost?

4. A woman went to market with chickens. She sold 15 and had 7 left. How many did she take to market?

5. Henry is 9 years old and his father is 29 years older. How old is his father?

6. There were 19 children in our class, and 8 more came in. How many were there then?

7. A tree on our lawn is 46 years old. How old will it be 7 years from now?

8. One apple tree in Mr. French's orchard bore 17 boxes of apples and another bore 6 boxes. How many boxes of apples did both trees bear?

9. In Mr. Farmer's orchard there are 57 apple trees and 6 pear trees. How many trees are there in the orchard?

10. Edward caught 5 fish and his brother caught 27. How many did both catch?

11. 48 boys and 7 girls are how many children?

12. In going to his uncle's house, Albert rode 18 miles and walked 3 miles. How far did he travel?

13. Irving earned 15 cents sprinkling Mr. Fox's lawn, and 10 cents sweeping the walk. How much did he earn?

1. A tablet for 8 cents and a pencil for 5 cents will cost how much in all?

2. 18 boys and 8 girls in a class are how many pupils?

3. Belle bought a box of berries for 9 cents and a bunch of green onions for 5 cents. What did she pay for both?

4. Ted sold 5 of his chickens and had 5 left. How many had he at first?

5. Katherine is 9 years old and Ralph is 9 years older. How old is Ralph?

6. There were 9 people at our summer camp and 8 more came to spend the day. How many were there then?

7. Joel is 6 years old. How old will he be 7 years from now?

8. Wilbur picked 7 boxes of apples and 6 boxes of pears. How many boxes of fruit did he pick?

9. The Grant school baseball team scored seven times in the first game and six times in the second. How many times did it score in the two games?

10. Willis and his father went fishing. Willis caught 5 trout and his father caught 7. How many did both catch?

11. Blanche ironed 8 handkerchiefs and 7 towels for her mother. How many pieces did she iron?

12. Mark bought a lunch for eighteen cents and had seven cents left. How much had he at first?

One hundred is written	**100**
Two hundred is written	**200**
Five hundred is written	**500**

1. Write in figures: four hundred; seven hundred; eight hundred.

2. Read: 300; 600; 700; 400; 200; 500; 900.

324 is read **three hundred twenty-four.** 642 is read **six hundred forty-two.**

3. Read: 759; 483; 279; 585; 986; 361; 416; 313.

4. Write: four hundred twenty-one; three hundred forty-nine; six hundred fifty-two; one hundred forty-one; two hundred ninety-one; seven hundred sixteen; nine hundred seventy-seven.

Three hundred five is written	**305**
Four hundred six is written	**406**
Nine hundred one is written	**901**

5. Read: 307; 409; 601; 502; 704; 308; 205.

6. Read: 204; 108; 902; 503; 806; 703; 607.

7. Write: seven hundred six; eight hundred five; two hundred three; one hundred seven; two hundred nine; nine hundred one.

8. Read: 149; 785; 109; 983; 415.

9. Write: eight hundred seventy-nine; six hundred twelve; four hundred thirty-seven; nine hundred five.

10. Write in words: 625; 801; 318; 207; 800.

Five hundred thirty is written	**530**
Two hundred seventy is written	**270**
Eight hundred ten is written	**810**

1. Read: 230; 190; 480; 360; 940; 640; 120.

2. Read: 180; 270; 440; 470; 610; 310; 910.

3. Write: seven hundred thirty; four hundred twenty; six hundred seventy; nine hundred eighty; seven hundred forty.

4. Read: 749; 982; 507; 308; 701; 209; 685; 420.

5. Read: 385; 769; 835; 429; 651; 910; 203; 519.

6. Read: 999; 807; 666; 342; 111; 405; 612; 711.

7. Read: 359; 460; 580; 307; 222; 809; 980; 630.

8. Write: five hundred ninety; five hundred nine; nine hundred forty-one; three hundred sixty; four hundred six; eight hundred seventy.

The *right-hand* figure is called **units'** figure; the *second,* **tens'** figure; the *third,* **hundreds'** figure.

634 is 6 *hundreds,* 3 *tens,* and 4 *units.*

The cipher, or zero, is used to show that there are no units, or that there are no tens.

9. Tell the number of hundreds, tens, and units in 246; 321; 245; 807; 650; 718; 320; 510.

10. Write the number that is made of 5 tens and 7 units; 9 tens and 2 units; 5 hundreds, 8 tens, and 4 units; 9 hundreds and 6 tens.

11. Read the numbers which you have written.

PROBLEMS OF WORK AND PLAY

1. Billy and Bobby are drawing wood home in their cart. They draw five sticks of wood at a load. How many sticks will they draw at two loads? At three loads? At four loads?

2. If they draw four sticks at a load, how many loads will 20 sticks make? How many loads will 12 sticks make?

3. They drew 5 loads on Monday, 8 on Tuesday, 7 on Wednesday, and 8 on Saturday. How many loads did they draw in the four days?

4. They are paid 1 cent a load and draw three loads an hour. How many hours must they work to earn 18 cents?

5. Bobby is 4 years old and Billy is 7. How old will each of them be eight years from now?

6. Frank and Fred gathered one morning from their garden 8 pounds of peas and 9 pounds of beans. How many pounds of both did they gather?

7. How much are two pounds of beans worth at 9 cents a pound?

8. How much are 3 pounds of peas worth at 8 cents a pound?

9. Four bunches of carrots are worth how much when 2 bunches are worth 5 cents?

10. Six tomato plants at 4 cents apiece cost how much?

11. How many pounds of early tomatoes at 8¢ a pound will 24 cents pay for?

1. *Add:*

23 40 21 62 51 197	We add the units' column and the tens' column separately. In adding, say: "Three, four, seven." "Eleven, thirteen, seventeen, nineteen."

Add:

2.	7	**3.**	5	**4.**	4	**5.**	2	**6.**	12	**7.**	22	**8.**	22	**9.**	12
	4		4		7		4		17		31		11		11
	3		6		2		6		30		42		33		11
	2		1		3		5		20		4		21		24
10.	41	**11.**	51	**12.**	41	**13.**	51	**14.**	61	**15.**	72	**16.**	33		
	13		42		20		62		33		80		55		
	21		63		75		73		40		61		40		
	13		12		32		80		54		53		61		
17.	92	**18.**	63	**19.**	91	**20.**	73	**21.**	80	**22.**	34	**23.**	45		
	70		80		80		51		30		51		71		
	60		71		63		40		45		60		63		
	47		52		74		65		73		93		80		
24.	82	**25.**	30	**26.**	63	**27.**	77	**28.**	83	**29.**	83	**30.**	90		
	71		90		71		91		90		42		90		
	50		73		42		60		41		61		90		
	40		45		91		90		61		83		90		

1. Add 59 and 8.

59	8 units and 9 units are 17 units.
8	17 units = 1 ten and 7 units.
67	1 ten and 5 tens are 6 tens. 67, *Answer.*

2. Add 68 and 96.

68	6 units and 8 units are 14 units.
96	14 units = 1 ten and 4 units.
164	1 ten, 9 tens, and 6 tens are 16 tens.
	16 tens = 1 hundred and 6 tens. 164, *Answer.*

NOTE.— Explanations of processes in addition, subtraction, multiplication, and division should not be dwelt upon unduly. Yet it is well for children to see how results are obtained, though they may not be required to repeat an intricate analysis of the operation.

Add:

3.	28	**4.**	36	**5.**	93	**6.**	29	**7.**	43	**8.**	78	**9.**	66
	4		7		8		9		9		3		8
10.	42	**11.**	96	**12.**	28	**13.**	46	**14.**	29	**15.**	37	**16.**	42
	8		9		3		5		6		8		9
17.	86	**18.**	42	**19.**	96	**20.**	18	**21.**	16	**22.**	19	**23.**	86
	33		69		25		73		46		43		44
24.	35	**25.**	96	**26.**	98	**27.**	99	**28.**	10	**29.**	70	**30.**	52
	48		57		63		34		48		30		19
31.	87	**32.**	85	**33.**	18	**34.**	17	**35.**	67	**36.**	45	**37.**	93
	24		49		14		15		24		85		29

1.

28 45 16 34 123	4 units, 6 units, 5 units, and 8 units are 23 units. 23 units = 2 tens and 3 units. 2 tens, 3 tens, 1 ten, 4 tens, and 2 tens are 12 tens. 12 tens = 1 hundred and 2 tens. 123, *Answer.* In adding, say "10, 15, 23"; then say "5, 6, 10, 12."

2.	15	**3.**	24	**4.**	17	**5.**	15	**6.**	54	**7.**	12	**8.**	19
	24		16		34		34		47		24		82
	35		33		23		26		32		16		41
	14		12		52		41		23		35		63
9.	22	**10.**	24	**11.**	17	**12.**	15	**13.**	56	**14.**	17	**15.**	46
	43		33		26		25		34		25		20
	14		17		34		37		12		34		32
	37		26		43		12		29		40		55
16.	23	**17.**	14	**18.**	26	**19.**	25	**20.**	46	**21.**	29	**22.**	92
	42		18		13		43		34		41		8
	25		22		47		58		55		32		31
	12		14		12		64		42		68		40
23.	43	**24.**	76	**25.**	83	**26.**	91	**27.**	92	**28.**	35	**29.**	19
	36		39		79		82		83		28		20
	80		48		48		73		17		71		99
	51		51		91		65		50		82		72
30.	90	**31.**	82	**32.**	20	**33.**	78	**34.**	44	**35.**	92	**36.**	77
	81		48		48		5		66		39		21
	29		61		70		43		77		73		60
	60		27		98		9		50		65		97

1. Find the whole cost of a pencil at 5 cents, a tablet at 8 cents, and a stamp at 2 cents.

2. 5 cents, 2 cents, 4 cents, and 12 cents are —— cents.

3. If a peach cost 2 cents, an orange 6 cents, and a pineapple 12 cents, they all cost —— cents.

4. Add 2 to 9; 19; 29; 39; 49; 59; 69; 79; 89; 99.

5. Add 3 to 8; 18; 28; 38; 48; 58; 68; 78; 88; 98.

6. 7+4=? 17+4=? 27+4=? 37+4=? 47+4=?

7. 7+5=? 17+5=? 27+5=? 37+5=? 57+5=?

8. *Add:*

7	17	27	37	47	57	67	77	87	97
6	6	6	6	6	6	6	6	6	6

9. Count by 3's from 0 to 30; from 1 to 31; from 2 to 32.

10. Count by 4's from 0 to 40; from 1 to 37; from 2 to 38.

11. Count by 3's from 50 to 0; from 49 to 1.

12. Count by 5's from 1 to 31; from 3 to 33.

13. Count by 6's from 40 to 0; from 5 to 29.

14. Count by 6's from 1 to 31; from 3 to 27.

15. Count by 7's from 0 to 35; from 1 to 29; from 2 to 30.

16. A kite, an orange, a ball, and a top each cost 5 cents. How much did all cost?

1. *Add:*

24
12
36 } *Addends*
14
86 *Sum*

The numbers added are **addends.**
The result of addition is the **sum.**

NOTE. — In adding, do not repeat the figures.
In example 1, say { 10, 12, 16,
2, 5, 6, 8.

2.	12	**3.**	23	**4.**	24	**5.**	37	**6.**	97	**7.**	54	**8.**	61
	36		27		58		35		35		33		32
	24		45		32		46		56		25		45
	15		56		46		25		87		29		37
9.	13	**10.**	21	**11.**	33	**12.**	39	**13.**	83	**14.**	66	**15.**	98
	42		42		24		40		21		42		32
	25		31		44		8		40		81		43
	67		56		55		60		9		38		37
16.	88	**17.**	66	**18.**	99	**19.**	22	**20.**	90	**21.**	42	**22.**	98
	42		42		88		39		88		66		21
	36		91		32		42		19		37		32
	77		33		41		70		18		41		14
23.	62	**24.**	22	**25.**	32	**26.**	33	**27.**	21	**28.**	61	**29.**	64
	14		44		45		25		15		28		38
	28		91		16		40		17		33		21
	33		18		94		28		83		25		45
30.	22	**31.**	39	**32.**	29	**33.**	88	**34.**	96	**35.**	24	**36.**	81
	33		41		38		64		38		86		28
	44		80		50		49		80		19		72
	55		16		96		82		19		81		19

The *fourth* figure in a number, counting toward the *left*, is **thousands'** figure.

9000 = *nine thousand.* 3000 = *three thousand.*

6241 = *six thousand two hundred forty-one.*

1. Read: 2128; 4521; 7938; 8000; 8106; 2300; 5840; 6007; 9017; 2307; 8111.

2. Write: five thousand; one thousand three hundred sixty-seven; one thousand nine hundred nine; four thousand eight; two thousand ninety-three.

Add up, then down. Read addends and sums.

3.	324	**4.**	142	**5.**	612	**6.**	416	**7.**	423	**8.**	324
	132		353		225		527		576		521
9.	351	**10.**	254	**11.**	341	**12.**	649	**13.**	894	**14.**	342
	460		165		205		427		783		643
	243		342		370		583		527		845
15.	786	**16.**	483	**17.**	213	**18.**	138	**19.**	923	**20.**	238
	483		547		426		24		761		182
	765		592		325		805		302		302
	293		384		136		41		50		56
21.	314	**22.**	517	**23.**	514	**24.**	235	**25.**	216	**26.**	932
	280		281		283		415		31		18
	179		305		107		800		58		271
	250		490		920		70		814		526
	303		235		116		59		76		32

100 *cents make* 1 *dollar. We write it* **$1.00.**
200 *cents make* 2 *dollars. We write it* **$2.00.**
500 *cents make* 5 *dollars. We write it* **$5.00.**
125 *cents make* 1 *dollar and* 25 *cents. We write it* **$1.25.**
349 *cents make* 3 *dollars and* 49 *cents. We write it* **$3.49.**
17 *cents is written* **$.17, 17ct.,** or **17¢.**
6 *cents is written* **$.06, 6ct.** or **6¢.**

1. 225 cents make how many dollars and cents?
2. Write this, using the dollar sign.
3. Read: $4.00; $6.00; $15.00; $25.00; $49.00.
4. Read: $1.25; $2.25; $4.35; $6.23; $17.53; $.08.
5. Read: $4.32; $7.50; $1.05; $16.10; $.10.
6. Read: $27.20; $8.07; $2.10; $30.01; $.95.
7. Read: $2.52; $1.37; $2.49; $4.03; $81.20.
8. Read the numbers in question 4 as cents.
9. $2.43
   1.27
   6.45
   5.81
   6.35

   Read these addends as cents, then as dollars and cents.
   Add them and read the sum.

Read and add:

10.	12.	13.	14.	15.
$ 4.23	$ .42	$3.81	$1.86	$2.35
6.87	1.37	.59	2.35	4.16
4.19	.58	.47	4.81	.89
12.15	.69	.33	7.63	5.71
8.52	4.73	4.44	.48	.60

1. James had \$.29 and found \$.02. He then had —— cents.

2. Dennis gathered 57 pink radishes and 5 white ones from his garden to-day. In all he gathered —— radishes.

3. How many pupils in a class composed of 23 girls and 8 boys?

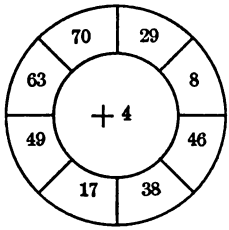
4. A yard of cloth cost 56 cents and a yard of ribbon 9 cents. They both cost —— cents.

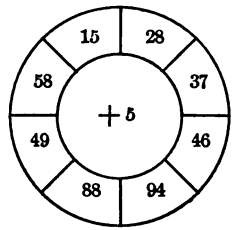
5. Otto sold 18 Ledgers and 7 Reviews. He sold —— papers in all.

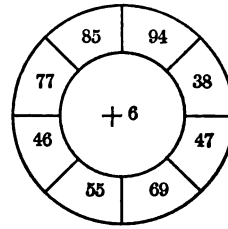
6. Two fours and five threes make how many?

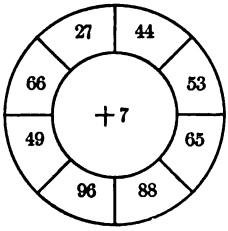
7. *Add:*

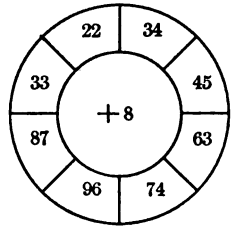
36	49	36	42	38	64	85	39
7	8	5	9	6	9	7	9

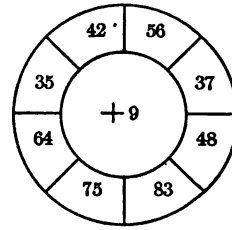












PROBLEMS OF THE HOME

1. Henry purchased at the store: 1 pound of butter, 45 cents; one box of soap, $4.20; a sack of sugar, $6.30; a sack of flour, $1.85. What did all cost?

2. Mary bought a Christmas tree for 65 cents, candles for 10 cents, ornaments for 85 cents, holly for 25 cents, flowers for 45 cents, and gifts for her father and mother for $1.84. How much money did all these cost?

3. In Lucy's house there are five bookcases. In one there are 248 books, in another 184, in another 380, in another 460, in another 480. How many books in all?

4. The expenses of our family for the first week in January were $17.38, the second week $15.78, the third week $18.05, the fourth week $20.36. How much did we spend in the four weeks?

5. Charlie's hens laid 211 eggs in February, 429 in March, 507 in April, 398 in May, and 286 in June. How many eggs did they lay in the five months?

6. Charlie sold eggs to the amount of $6.82 in February, $8.92 in March, $7.38 in April, $6.30 in May, and $4.85 in June. How much did he receive?

7. Frances and her mother canned 92 pounds of berries, 87 pounds of tomatoes, 90 pounds of corn, 120 pounds of beans, and 136 pounds of peaches. How many pounds did they can in all?

SHORT TESTS

I.
7+7+3+8=——
6+8+6+2=——
5+3+9+5=——
8+9+7+7=——
+ + + = ?

II.
6+5+7+2+6=——
5+7+6+9+9=——
4+6+8+7+4=——
8+8+5+8+3=——
+ + + + = ?

III.
9+6+5+6=——
4+7+8+3=——
2+5+4+9=——
8+4+7+5=——
7+7+6+4=——
+ + + = ?

IV.
7+8+9+6+8=——
6+9+4+4+7=——
9+5+3+5+5=——
5+4+1+3+4=——
3+3+7+8+8=——
+ + + + = ?

V.
3+6+4+8=——
5+2+9+6=——
4+3+2+1=——
8+6+9+5=——
+ + + = ?

VI.
9+3+8+10+5=——
6+4+2+ 4+8=——
7+8+3+ 9+2=——
6+0+5+ 7+3=——
+ + + + = ?

VII.

1.	2.	3.	4.
783	$6.07	$ .96	$12.10
472	.49	4.71	3.19
921	.63	5.83	.29
687	4.07	6.92	17.00
432	.21	.88	6.31

VIII.

1.	2.	3.	4.
$ 4.83	$8.49	$19.07	$ 8.36
.79	6.72	10.50	.48
6.85	.36	.18	.90
12.92	4.07	3.98	4.07
13.07	5.60	7.62	16.00

PROBLEMS OF THE FARM

1. Mr. Hodge raised in one year 427 bushels of barley, 965 bushels of wheat, 993 bushels of corn, and 209 bushels of oats. How many bushels of grain did he raise?

2. Five brothers have adjoining farms of the following sizes: 140 acres, 98 acres, 215 acres, 187 acres, and 267 acres. How many acres of land do they all own?

3. A poultry buyer bought during one week 237 chickens, 349 turkeys, 138 geese, and 218 ducks. How many fowls of all kinds did he buy?

4. Mr. Grant paid out in one year $927 for labor, $29.75 for seeds, $248.25 for machinery, $186.19 for lumber, $22.80 for paint, and $218.95 for supplies. How much did all these expenses amount to?

5. George sold seven calves which he had cared for until they were eight weeks old. Their weights at that time were 172 lb., 184 lb., 168 lb., 196 lb., 204 lb., 179 lb., and 193 lb. What was their total weight?

6. In 1916, Mr. Smith's apple orchard yielded 187 boxes of King apples, 249 boxes of Winesaps, 832 boxes of Wagners, 721 boxes of Jonathans, 379 boxes of Greenings, and 698 boxes of Northern Spies. How many boxes of apples did the orchard yield?

7. Make a problem that requires you to add five numbers.

1. Frank bought 12 peaches and ate three of them. How many were left?

Add and subtract:

2.	8	13	7	14	3.	10	9	12	11
	5	5	5	5		5	5	5	5
4.	9	11	13	12	5.	10	7	8	6
	4	4	4	4		4	4	4	4
6.	5	9	12	10	7.	9	11	6	8
	3	3	3	3		3	3	3	3
8.	12	10	13	16	9.	17	11	15	14
	8	8	8	8		8	8	8	8
10.	10	9	12	16	11.	14	11	13	15
	7	7	7	7		7	7	7	7
12.	8	10	11	14	13.	15	12	9	13
	6	6	6	6		6	6	6	6
14.	13	11	14	16	15.	12	18	17	15
	9	9	9	9		9	9	9	9

16. $2+?=11$ $2+?=21$ 17. $3+?=12$ $3+?=22$

18. $9+?=16$ $7+?=14$ 19. $5+?=12$ $7+?=15$

20. Take a foot from 17 inches. How many inches are left?

21. Take 5 cents from a dime. How many cents are left?

22. A dime is how much more than 3 cents?

1. Mr. Moss had \$378 in the bank and drew out \$135. How much was left in the bank?

\$378	*Minuend*	5 units from 8 units leave 3 units.
135	*Subtrahend*	3 tens from 7 tens leave 4 tens.
\$ 243	*Remainder*	1 hundred from 3 hundreds leaves 2 hundreds.

NOTE. — Some prefer 5 units and ? are 8 units, 3 tens and ? are 7 tens, 1 hundred and ? are 3 hundreds.

The number from which we subtract is the **minuend.**
The number subtracted is the **subtrahend.**
The result of subtraction is the **difference** or **remainder.**

2. From 948 take 716. Which of these numbers is the minuend? What shall we call the other?

3. 836	4. 956	5. 507	6. 738	7. 89
−142	−25	−203	−607	−26
8. 938	9. 769	10. 807	11. 486	12. 985
−873	−553	−503	−375	−474
13. 631	14. 639	15. 863	16. 347	17. 450
−420	−317	−751	−216	−320

18. The subtrahend is 342 and the minuend 483. What is the difference?

19. The minuend is 98 and the subtrahend 48. Find the remainder.

20. What is the difference between 837 and 206?

21. How much larger is 984 than 863?

22. What number added to 48 makes 89?

23. A kite string 897 feet long is how much longer than a kite string 492 feet long?

SHORT TESTS

I. *Oral.*

2	5	8	10	7	11	3	12	6	4	9

1. Add 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12 to the number in each square.

2. Subtract each number in the squares from 14; from 15; from 16; from 17; from 18.

Add:

3. 5 15 6 16

6 6 6 6

4. 7 27 9 19

8 8 8 8

II. *Written.*

1. *Add:*

38 99 28

74 43 95

2. *Add:*

92 86 49

88 18 35

3. 296 miles is how much farther than 85 miles?

4. 987 − 885 = ?

5. A bushel of apples cost $1.25
A box of oranges cost 4.35
A box of soap cost 3.45
A dozen cans of corn cost 1.44
They all cost

6. Find the difference between 104 and 507.

7. $14.28 − 12.06

8. $85.92 − 15.70

9. $86.27 − 16.15

10. $12.86 − 9.10

1. Waldo earned 30 cents and bought an apple for 2 cents. How much money did he then have?

EXPLANATION: $30 = 20 + 10$
$2 = \quad 2$
$20 + 8 = 28$, *Difference.*

WRITE IT THIS WAY:
30 cents
2 cents
28 cents

Subtract:

2.	10	20	40	50	3.	70	80	90	60
	2	2	2	2		5	5	5	5
4.	10	30	50	40	5.	70	60	90	80
	3	3	3	3		6	6	6	6

6. Hazel's mother made 53 cups of jelly. After 7 cups had been used, how many were left?

EXPLANATION: $53 = 40 + 13$
$7 = \quad 7$
$40 + 6 = 46$, *Difference.*

WRITE IT THIS WAY:
53 cups
7 cups
46 cups

Subtract:

7.	14	34	54	84	8.	17	27	57	47
	7	7	7	7		9	9	9	9
9.	15	25	45	75	10.	11	51	61	31
	8	8	8	8		4	4	4	4
11.	19	24	37	43	12.	22	37	42	53
	9	8	9	6		8	8	3	4

1. There are nine hundred seventy-four pupils in our school. One hundred twenty-six of them are in the third grade. How many are in other grades?

See notes, p. 71 and p. 60.

974 = 9 hundreds + 6 tens + 14 units
126 = 1 hundred + 2 tens + 6 units
848 = 8 hundreds + 4 tens + 8 units *Difference*

We cannot take 6 from 4. So we take 1 ten out of 7 tens, put it with 4, making 14 units, and subtract 6 units from 14 units. We then take 2 tens from 6 tens, and 1 hundred from 9 hundreds. (How do we get 6 tens?) 848 pupils, *Answer*.

2.	3.	4.	5.	6.	7.
981	352	764	662	983	382
−732	−135	−545	−254	−874	−174

8.	9.	10.	11.	12.	13.
641	423	752	923	892	183
−512	−219	−538	−706	− 77	−125

Oral.

1. From 15, 25, 35, 55, 75, 85, take 6, 7, 8, and 9.

2. Take 7, 8, and 9 from each of the following numbers: 16, 26, 36, 46, 56, 66, 76, 86, and 96.

3.	17	27	37	47	57	67	77	87
	− 8.	− 8	− 8	− 8	− 8	− 8	− 8	− 8
4.	17	27	37	47	57	67	77	87
	− 9	− 9	− 9	− 9	− 9	− 9	− 9	− 9
5.	18	28	38	48	58	68	78	88
	− 9	− 9	− 9	− 9	− 9	− 9	− 9	− 9

1. From 629 take 237.

629	= 5 hundreds + 12 tens + 9 units
237	= 2 hundreds + 3 tens + 7 units
392	= 3 hundreds + 9 tens + 2 units

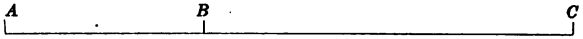
Can you tell how this is done? How do we get 12 tens? How do we get 5 hundreds?

2. 732	3. 608	4. 709	5. 536	6. 319	7. 340
−313	−27	−358	−435	−258	−190
8. 149	9. 918	10. 439	11. 906	12. 708	13. 435
−56	−48	−247	−514	−693	−250

Oral.

1. Twenty boys went camping. All but 9 of them caught cold. How many boys caught cold?

2. A mother hen hatched 13 chickens. Only 8 of them lived. How many died?

3. 

If it is 24 miles from A to C, and 8 miles from A to B, how far is it from B to C?

4. Ted rode his bicycle 18 miles from home. He turned about and had ridden 12 miles toward home when his tire burst, so that he had to walk. How far had he to walk? (Picture as in 3.)

5. Anna bought a tablet for 8 cents. If she gave the clerk a quarter of a dollar, how much change should she receive?

1. $18 - 10 = ?$ What can you do with 10 and 8 to get 18?

2. What can you do with 12 and 5 to get 7? With 5 and 7 to get 12?

3. $13 - ? = 9$ $9 + ? = 13$ $13 ? 9 = 4$ $9 ? 4 = 13$

4. Henry earned \$15. He bought some clothes for \$7 and put the rest of his money in the bank. How much did he put in the bank? How do you find it?

5. If Henry put \$8 in the bank and spent \$7 for clothes, how would you find the amount he had at first?

6. 12, 18, 6. Show all the things that you can do with two of these numbers to get the other.

Written.

1. $\begin{array}{r} 467 \\ -325 \\ \hline \end{array}$ Find the remainder. Add the remainder and subtrahend. What do you get? If you should not get the minuend when you add the subtrahend and remainder, what would you think was the reason? Since you do get the minuend by adding the subtrahend and remainder, what does it tell you about the remainder? How can you find out whether or not any remainder is correct?

Find the remainders and test your work:

2. $\begin{array}{r} 342 \\ -121 \\ \hline \end{array}$ 3. $\begin{array}{r} 987 \\ -603 \\ \hline \end{array}$ 4. $\begin{array}{r} 658 \\ -435 \\ \hline \end{array}$ 5. $\begin{array}{r} 709 \\ -209 \\ \hline \end{array}$ 6. $\begin{array}{r} 917 \\ -615 \\ \hline \end{array}$

7. $\begin{array}{r} \$52.63 \\ -12.91 \\ \hline \end{array}$ 8. $\begin{array}{r} \$82.49 \\ -26.39 \\ \hline \end{array}$ 9. $\begin{array}{r} \$16.81 \\ -7.19 \\ \hline \end{array}$ 10. $\begin{array}{r} \$12.81 \\ -9.35 \\ \hline \end{array}$

Find the remainders and test your work:

1. 763 528	**2.** 307 164	**3.** 625 218	**4.** 658 435	**5.** 719 217
6. 947 615	**7.** 456 295	**8.** 887 479	**9.** 715 263	**10.** 984 237
11. $9.35 2.48	**12.** $2.19 1.36	**13.** $9.10 3.50	**14.** $17.25 9.32	
15. $59.20 28.30	**16.** $49.37 25.66	**17.** $81.79 15.63	**18.** 865 429	
19. $12.93 5.09	**20.** $2.06 1.96	**21.** $4.37 .85	**22.** $19.28 15.00	

23. Mr. Brown bought a horse for $245 and sold it for $190. How much did he lose?

24. Clarence bought a sheep for $3.75 and sold it for $5.80. How much did he gain?

25. Six hundred seven pupils are enrolled in our school. Five hundred ninety-three are present. How many are absent?

26. I saw 956 boy scouts in a parade; 784 of them stood erect. How many were not erect?

27. 1296 − 473	**28.** 4381 − 2073	**29.** 981 − 973	**30.** 7120 − 500
31. 2013 − 1005	**32.** 408 − 231	**33.** 607 − 583	**34.** 370 − 219

1. 9 and 8 are the two parts of ——. 8 is one part of 17; the other part is ——.

2. One part of 25 is 7. What is the other?

3. William earned $.01 on Monday, $.02 on Tuesday, $.03 on Wednesday, and so on through the week. How much did he earn?

4. Tom and Joe caught 23 trout. Joe caught 12 of them. Tom caught ——.

5. Jessie and her mother pared 32 apples. Jessie pared six. Her mother pared ——.

6. A postman had 15 days' vacation. He went away for 8 days. How many days did he stay at home?

7. Ethel earned two dimes and 2 nickels. In all she earned —— cents.

Written.

Add up, then down. Do you get the same result?

1.	2.	3.	4.	5.
621	106	264	563	462
143	342	341	692	153
254	260	173	118	247
326	406	462	209	321
243	347	374	712	145

6.	7.	8.	9.	10.
598	390	635	264	246
321	408	962	324	314
607	761	48	149	270
53	29	307	254	186
908	382	42	326	409

Subtract and test your work:

1.	2.	3.	4.
6324	4713	$78.21	$63.92
4516	2804	34.05	44.08

5. Add two hundred nine, five hundred thirty-two, thirty-six, one thousand three hundred twenty-five, and eight hundred ten.

6. Add $564.32, $34.27, $248, $6.03, and $48.27.

7. A tank held 634 gallons of oil. 218 gallons leaked out. How much remained?

8. A grocer sold 539 pounds of coffee and had 756 pounds left. How many pounds had he at first?

9. $465.32 + $234.16 + $72.18 + $8 + $5.01 = ?

10. Subtract 153 from 506.

11. The two parts of a number are 479 and 1088. Find the number.

12. Claude has $5.08 in the school bank, $16.24 in the city savings bank, and $1.38 in his purse. How much money has he?

13. A farmer sold a load of potatoes to a grocer for $23.20. He bought some sugar, tea, and flour for $14.18. How much money should he receive?

14. Edward helped in his father's store. A customer bought a sack of flour for $1.80 and paid for it with a $5.00 note. How much change should Fred give him?

Find the difference between:

15. 589 and 692.
16. 437 and 928.
17. $52.26 and $16.19.
18. $345.16 and $192.95.
19. 3246 and 8109.
20. 235 and 1047.

USED BY 3 B TEACHERS

1. Lesson in making change: Give the children 10 pennies, 5 nickels, 2 dimes, 2 quarters, and 2 half dollars (toy money).

"I have a nickel. Who can change it? John, what will you give me?" "I will give you 5 pennies."

"I have a dime. Who can change it? Mary, what will you give me?" "I will give you 2 nickels."

"Who will change it another way?" "I will give you 10 pennies." "I will give you 1 nickel and 5 pennies."

"I have a quarter. Who can change it?" "I will give you 5 nickels." "I will give you 2 dimes and 1 nickel."

"I have a half dollar. Who can change it?" "I will give you 2 quarters." "I will give you 5 dimes." "I will give you 10 nickels." "I will give you 3 dimes and 4 nickels."

2. Contests in addition and subtraction are good. Two go to the blackboard. Give an example. The one who gets the correct answer first, wins. The other sits down. The winner chooses another and yet another. If he wins 3, he scores 5 points and sits until it is his turn again.

3. In teaching liquid measure, let one child play he is a milkman and state the price of milk per pint or quart. The other children should tell how much milk they wish and how much they will pay for it.

4. To make addition interesting: Let each child play he is shopping and has bought three, four, or five articles, and is to find out the total cost. Each child thus originates his own problem, and no two are alike.

5. Visualize combinations: Children are shown a group of 3 or 4 combinations for an instant and required to give the answers.

6. In using the table on page 43, load a freight train and see who can first reach Seattle or Chicago, or some town with which pupil is familiar. Some will be slow freight, but all will try to have a fast train. Vary the exercise by suggesting that any mistake is a wreck (pupil engineer responsible) and disqualifies the engineer until his turn to recite again. Have mail trains, express trains carrying fruit, etc. Great help in subtraction drill.

7. Put figures on board in column. Pupils add silently as placed on board. As soon as the last figure is placed, erase the column. Ask for answer.

1. Count by 8's to 24. $8 + 8 + 8 = ?$ Three 8's are how many?

2. $8+8=?$ $16-8=?$ $8+?=16$ $16+?=24$.

3. What is $\frac{1}{3}$ of 24? How many 8's in 24?

4. 8 cents and a half dime are how many cents? A dime and 8 cents? 8 cents and what make a dime?

5. A dozen pencils are how many more than 8?

6. How many quarts in a gallon? How many pints in a quart? How many pints in a gallon?

7. How many pints in 2 gallons? In 3 gallons?

8. A dozen and 8 lemons are how many lemons?

9. Draw on the blackboard a figure like this, making it 10 inches long and 8 inches wide. How many inches across the two ends together? Across both sides? Across one end and one side?

10. $10+10=?$ $8+8=?$ $10+8=?$ $18-10=?$

11. Mary has 9 cents and Helen 8. How many cents have both? $9 + 8 = ?$ $17 - 9 = ?$ $17 - 8 = ?$

12. Dorothy found 11 buttercups and Helen 7. How many buttercups did both find? $18 - 7 = ?$ $18 - 11 = ?$ $11 + ? = 18$.

13. A foot and 7 inches are how many inches? A foot and 9 inches? A foot and 11 inches? A foot and 10 inches?

14.

13	15	16	17	13	11	18	17
− 8	− 7	− 8	− 9	− 11	− 11	− 10	− 10

15. $3\overline{)24}$ $6\overline{)24}$ $12\overline{)24}$ $8\overline{)24}$ $4\overline{)24}$ $6\overline{)12}$ $2\overline{)16}$

1. I am a little fish and live in the —— river. I have 14 brothers and 9 sisters. There are —— children in our family.

One day a boy came down to the river and dipped $\frac{1}{3}$ of us out of the water. We felt sad at losing —— children. We had only —— children left.

Five of our brothers went to the bank to find the children that were gone. A little girl caught the 5 brothers. Then there were only —— children.

In a little while the boy brought back the 8 children because they were too small to eat; then there were —— of us.

Soon afterward the little girl brought back our 5 brothers and again there were —— of us.

2. There were 36 candles on Father's birthday cake. Baby blew out 2, May 7, Mother 10, and I, 7. We all blew out —— candles. There were —— candles left burning.

3. There were 6 children at Edith's birthday party. Her birthday cake was cut in 16 pieces. Each child had two pieces. In all they had —— pieces. There were —— pieces left.

4. Alfred bought a pair of gloves for 75 cents, a tie for 25 cents, and a pair of hose for 25 cents. They all cost ——. He gave the clerk a $2.00 bill, and received —— in change.

1. Rupert's pet chicken ate from his hand 9 kernels of corn, 8 of wheat, 3 of oats, and 5 of barley. How many kernels did the chicken eat in all?

2. Mrs. Smith buys a pint of cream every day. How many quarts does she buy in 24 days?

3. One half of a foot is how many inches? $\frac{1}{3}$ of a foot? $\frac{1}{4}$ of a foot? $\frac{1}{6}$ of a foot? (Picture.)

4. Five gallons of milk will serve how many customers if each takes a quart? If each takes a pint?

5. Frank bought a top for 5 cents, and three oranges for 10 cents. How much did he pay in all?

SHORT TESTS

I. 1. *Add:*

9	29	8	48	7	27
2	2	6	6	5	5

2. *Subtract:*

11	17	16	15	12	11
8	9	8	7	5	3

3. *Find:* $\frac{1}{2}$ of 16; $\frac{1}{3}$ of 24; $\frac{1}{5}$ of 20; $\frac{1}{7}$ of 21.

4. $7 \times 2 = ?$ $16 + 0 = ?$ $4 \times 3 = ?$ $5 \times 4 = ?$

5. How many 6's in 12? In 24? In 18?

II. 1. Count by 4's from 0 to 40.

2. Count by 5's from 1 to 36.

3. Give the table of 6's in addition.

4. Give the table of 9's in addition.

5. Two feet are how many inches?

1. *Some of the things that we have learned:*

a. —— pints make a quart.

b. There are —— quarts in a gallon.

c. —— inches make 1 foot.

d. One yard is the same as —— feet.

e. One dollar is equal to —— cents.

f. A half dime is —— cents.

g. Ten cents make one ——.

h. The numbers added are the ——.

i. The result of addition is the ——.

j. The number from which a number is subtracted is the ——.

k. The remainder added to the —— gives the ——.

l. We may test our work in subtraction by ——.

2. A house that is 8 yd. wide is —— feet wide.

3. A cow that gives 12 quarts of milk gives —— gallons.

4. A rule that is 24 inches long is —— feet long.

5. Two dimes and a half dime make —— cents, or one —— of a dollar.

6. Express your age in Roman numerals.

7. There are 24 rose bushes in 3 equal rows. How many in a row? (Picture.)

8. How many oranges at 4 cents apiece can I buy for 2 dimes?

9. Harold is 9 years old. How old will he be 8 years from now? 12 years? 16 years? 7 years? 13 years?

10. Count by 8's to 32; by fours; by 2's.

1. A merchant bought 459 yd. of silk, 847 yd. of flannel, 1027 yd. of muslin, 439 yd. of prints, and 2348 yd. of broadcloth. How many yards did he buy?

2. A city has 429 miles of streets. If 238 miles are paved, how many miles are unpaved? Test your work.

3. Add three thousand forty dollars fifteen cents, two hundred twenty-seven dollars fifty-six cents, and ten dollars forty-nine cents.

4. Two men start from the same place; one travels east 983 miles, the other travels west 479 miles. They are then how many miles apart? (Picture.)

5. A man earned $581 in one year, $748 the next, and $857 the next. *a.* How much did he earn in the three years? *b.* If he spent $1479, how much did he save?

6. *Express in Roman numerals:*

a. The number of feet in a yard.
b. The number of quarts in a gallon.
c. The number of feet in 2 yards.
d. The number of inches in a foot.
e. The number of cents in a dime.
f. The hour when school begins.
g. The number of days in a week.
h. Your age in years.
i. The number of pints in a gallon.
j. The number of school days in a week.

7. Make a subtraction problem about earning and saving.

1. Eight years from now May will be 20 years old. How old is she now?

2. What coin is $\frac{1}{4}$ of 20 cents? $\frac{1}{2}$ of 20 cents? $\frac{1}{4}$ of a dollar?

3. Nellie had 21 cents and spent $\frac{1}{3}$ of it. *a.* How many cents did she spend? *b.* How many cents has she left? (Picture.)

4. There are 24 hours in one day. How many hours in $\frac{1}{3}$ of a day?

5. Eight 2's less five 3's are how many? (Picture.)

6. Five kittens have how many paws? (Picture.)

7. Six squares have how many corners? Cut them from paper, then fold them into halves and quarters.

8. Kate had 38 peaches and gave away 9. How many had she then? (Picture.)

9. If 3 pounds of dates cost 24 cents, what will one pound cost? What will 2 pounds cost?

10. $12 + ? = 22$. $? + 9 = 21$. $12 + 11 = ?$ $10 + ? = 22$.

11. Read: 5007; 2010; 5080; 2300; 9001; 1010.

12. 24 lemons are how many dozen? (Picture.)

13. Make a problem for $7 + 6$; for 3×6; for $21 - 11$; for $15 \div 3$; for 2×7; for $12 \div 2$.

14. 2 dozen oranges less 6 oranges are how many?

15. *Add and subtract:*

14	35	49	85	76	27	68	53	93
8	5	3	7	5	3	4	9	7

PROBLEMS OF WORK

1. Isabel made griddle cakes for the family's breakfast. She used:

1 pt. of milk at 10¢ a quart —— cents
1 egg at 48¢ a dozen —— cents
Flour, salt, and baking powder 6 cents
The cakes cost in all —— cents

2. Lester bought papers at a cent apiece and sold them at two cents apiece. How much did he make on 20 papers? How much did he receive for 12 papers? How many papers must he sell to receive 16 cents? How many papers must he sell to gain 16 cents?

3. Harold and Ruth gathered young wintergreens. Ruth tied them in bunches and Harold sold them at 3 cents a bunch. How much did he receive for 8 bunches? For 9 bunches? For 7 bunches? How many bunches must he sell to receive 15 cents? 18 cents? 24 cents? 30 cents? 12 cents?

4. Jack raises radishes and sells them at 2 cents a bunch. How much does he receive for 9 bunches? For 12 bunches? For 6 bunches? For 8 bunches? How many bunches must he sell to receive 10 cents? 14 cents? 20 cents? 24 cents?

5. Albert gathers chestnuts and sells them for 8 cents a pint. How many pints must he sell to receive 16 cents? How much does he receive for 3 pints? For a half pint?

3
3
3
3
3
3
3
3
3

1. How many 3's are there in this column?
2. Add them.
3. Nine 3's are how many?
4. Write three nines in a column.
5. Add them.
6. Three 9's are how many?
7. How many 3's are there in 27?
8. How many 9's are there in 27?
9. $9 \times 3 = ?$ $3 \times 9 = ?$ $27 \div 3 = ?$ $27 \div 9 = ?$
10. How much is $\frac{1}{3}$ of 27?
11. How much is $\frac{1}{9}$ of 27?
12. Count by 3's to 27.
13. Count by 9's to 27.
14. Write ten 3's in a column. Add them.
15. Ten times 3 are how many?
16. How many 3's are there in 30?
17. Three 10's are how many?
18. $\frac{1}{3}$ of $30 = ?$ $\frac{1}{10}$ of $30 = ?$
19. Write the table of 3's to 3×10. Learn it.
20. Can you find how many are 11×3 and 12×3?

Add:

21.	22.	23.	24.	25.
843	809	625	90	999
796	316	408	830	88
521	99	70	49	770
803	82	900	763	66
196	409	83	85	555

Add:

1.	2.	3.	4.
4	4	4	4
4	4	4	4
4	4	4	4
4	4	4	4
4	4	4	4
4	4	4	4
	4	4	4
		4	4
			4

5. Seven 4's are how many?
6. $7 \times 4 = ?$
7. Add four 7's.
8. $4 \times 7 = ?$
9. $28 \div 4 = ?$
10. $28 \div 7 = ?$
11. $\frac{1}{4}$ of $28 = ?$
12. $\frac{1}{7}$ of $28 = ?$
13. $4 \times ? = 28.$
14. $? \times 7 = 28.$
15. $28 \div ? = 4.$
16. $28 \div ? = 7.$
17. $\frac{1}{4}$ of $? = 7.$
18. $\frac{1}{7}$ of $? = 4.$

NOTE. — Observe that the number fact $7 \times 4 = 28$ has been presented above in thirteen different forms (Questions 6–18). Present the other facts in the same forms, for 8, 9, and 10 times 4. Drill!

19. Tell all the things you can learn from column 2.

20. Tell all the things you can learn from column 3.

21. Tell all the things you can learn from column 4.

22. Write the multiplication table of 4's to 10×4. Can you find 11 and 12 times 4?

23. Seven gallons of ice cream were served at our picnic. How many quarts of ice cream were served?

24. Mr. Strong, the blacksmith, has 36 horseshoes. How many horses can he shoe with them?

Add:

25.	26.	27.	28.	29.
358	88	888	999	999
490	106	888	999	888
76	93	888	999	999
109	572	888	999	777
888	90	888	999	666

1. Count by 5's to 100.

2. Write the multiplication table of 5's.

3. How many 5's are there in 30? In 50? In 35? In 45? In 40?

4. $4 \times 5 = ?$ $8 \times 5 = ?$ $9 \times 5 = ?$ $7 \times 5 = ?$ $6 \times 5 = ?$

5. $\frac{1}{5}$ of $30 = ?$ $\frac{1}{6}$ of $30 = ?$

6. $30 \div 6 = ?$ $30 \div 5 = ?$

7. How much money is needed to pay 9 carfares?

8. Fifty cents will pay the carfare of how many people?

9. Mark puts a nickel a day into his bank. How much does that amount to in a week?

The problems on page 91 refer to this lunchroom, where people buy their lunches by dropping nickels into different slots. The food is ready in glass cases, and when the correct number of nickels are dropped in the right places, dishes of food slip down from the glass cases and the people wait upon themselves.

1. Count by fives and find out how many nickels Edwin could get for a 25-cent piece at the change window. How many nickels could he get for a 50-cent piece?

Prices Given in Nickels

Ham sandwich 1	Frizzled beef 4
Tongue sandwich 2	2 Fried eggs 3
Meat loaf sandwich 1	Rice pudding 1
Bread and butter 1	Tea or coffee 1
Strawberry shortcake 2	Milk or cocoa 1
Cinnamon bun 1	Buttered toast 2
2 Tea biscuits 1	Ham and eggs 4
Griddle cakes 2	

Find how many cents each of these lunches would cost:

2. Two ham sandwiches and a glass of milk.

3. Griddle cakes, 2 fried eggs, and a cup of coffee.

4. A tongue sandwich and strawberry shortcake.

5. Ham and eggs and bread and butter.

6. Frizzled beef and buttered toast.

7. Two cinnamon buns and a cup of cocoa.

8. Two tea biscuits and a cup of coffee.

9. Two meat loaf sandwiches and a cup of tea.

10. Buttered toast, rice pudding, and glass of milk.

11. Frizzled beef, buttered toast, a cinnamon bun, and a cup of coffee.

12. Ham and eggs, griddle cakes, bread and butter, strawberry shortcake, and a cup of cocoa.

1. $4 + 4 + 4 + 4 + 4 = ?$ How many 4's did you add to get 20? Then 20 is how many 4's? In what other way than by addition may you find five fours?

2. Count by 3's until you have the sum of five 3's.

3. In what other way could you have found the value of five 3's? Which is the shorter way?

4. Find, by addition, seven 4's; eight 4's; nine 4's; ten 4's; eleven 4's; twelve 4's.

5. How many 4's in 40? 28? 36? 44? 16?

6. What is $\frac{1}{4}$ of 24? 12? 16? 44? 36? 28?

7. How many are three 4's? Five 4's? Ten 4's? Twelve 4's? Nine 4's? Eleven 4's?

8. Mr. Fancher has 8 horses that need new shoes all around. How many horseshoes must he pay for? Make many problems using 4.

NOTE. — In column addition, pupils should notice that whenever 9 is added, the right-hand figure of the sum is less by 1 than the right-hand figure of the number to which 9 is added. When 8 is added, the right-hand figure of the sum becomes less by 2.

E.g. $17 + 9 = 26$ $26 + 9 = 35$ $25 + 9 = 34$
$17 + 8 = 25$ $25 + 8 = 33$ $33 + 8 = 41$

In subtraction of 9 or 8, the converse is true.

E.g. $61 - 9 = 52$ $52 - 9 = 43$ $43 - 9 = 34$
$42 - 8 = 34$ $34 - 8 = 26$ $26 - 8 = 18$

Add:

9.	10.	11.	12.	13.
219	618	938	628	729
46	80	87	79	83
319	824	49	843	685
424	78	836	709	428
80	82	429	835	999

Add:

6	6	6	6	6
6	6	6	6	6
6	6	6	6	6
6	6	6	6	6
6	6	6	6	6
6	6	6	6	6
	6	6	6	6
		6	6	6
			6	6
				6

1. What is the sum of six 6's? Seven 6's? Eight 6's? Nine 6's? Ten 6's?

2. Write the multiplication table of 6's to 6×10.

3. Learn the table.

4. How many 6's are there in 12? In 24? In 36? In 60? In 54? In 42? In 30? In 48? In 18?

5. How many working days are there in 6 weeks? In 9 weeks? In 7 weeks? In 10 weeks? In 8 weeks?

6. How many spots are there on the double-six domino?

7. Can you find how many are 11×6? 12×6?

8. Maurice found by measurement that the corn in his garden was growing at the rate of an inch a day. In how many days would it grow six feet at that rate?

9. $6 \times 6 = ?$ $36 \div 6 = ?$ $\frac{1}{6}$ of $36 = ?$

10. $7 \times 6 = ?$ $42 \div 6 = ?$ $42 \div 7 = ?$ $\frac{1}{6}$ of $42 = ?$ $\frac{1}{7}$ of $42 = ?$

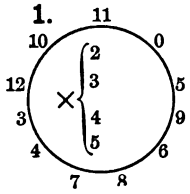
11. How many 6's are there in 42? How many 7's?

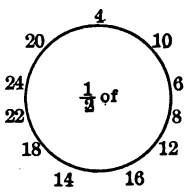
12. $8 \times 6 = ?$ $6 \times 8 = ?$ $48 \div 6 = ?$ $48 \div 8 = ?$ $\frac{1}{6}$ of $48 = ?$ $\frac{1}{8}$ of $48 = ?$

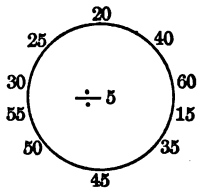
13. Tell all the things that may be learned from 9 times 6.

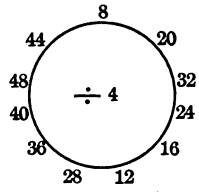
14. Tell all that we may learn from 10 times 6.

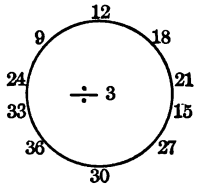
1.

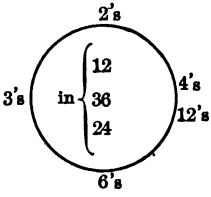












2. What is the cost of twelve 2-cent stamps?

3. Jessie is 9 years old; her brother is twice as old. How old is her brother?

4. How many pints will a 10-quart pail hold?

5. How many pints in a gallon? In 2 gallons? In 3 gallons?

6. *a.* Our schoolroom is 36 feet long. How many yards long is it? *b.* It is 9 yards wide. How many feet wide is it?

7. Five gallons of oil will fill a quart lamp how many times?

8. If 3 lemons will make a pitcherful of lemonade, how many lemons are needed for 9 such pitcherfuls?

9. Twenty-four eggs are how many dozen? 48 eggs?

10.

5	10	5	6	12	5	5	4
× 2	× 5	× 4	× 5	× 5	× 11	× 3	× 6

1. At $42 apiece, what will 4 rugs cost? Find it by addition.

We may also find it by multiplication, thus:

42	4 times 2 units are 8 units.
4	4 times 4 tens are 16 tens, or 1 hundred and 6 tens.
168	$168. *Answer.*

Multiply, and test your work by addition:

2. 64	**3.** 82	**4.** 51	**5.** 94	**6.** 93
2	4	6	2	3
7. 71	**8.** 82	**9.** 41	**10.** 83	**11.** 71
5	3	6	2	6
12. 843	**13.** 544	**14.** 932	**15.** 510	**16.** 811
2	2	2	6	5
17. 802 cents	**18.** 601 cents	**19.** 712 cents	**20.** 433 cents	
4	5	4	3	
21. 510 cents	**22.** $8.02	**23.** $6.01	**24.** $7.12	
6	4	5	4	

43 *Multiplicand*	*The number multiplied* is the **multiplicand.**
2 *Multiplier*	*The number by which we multiply* is the **multiplier.**
86 *Product*	*The result of multiplication* is the **product.**

Read the multipliers in examples **1–10.**
Read the product in example **1.**
Read the multiplicands in examples **17–24.**

1. There are 8 rooms in our school and 32 seats in each room. How many seats are there in the school?

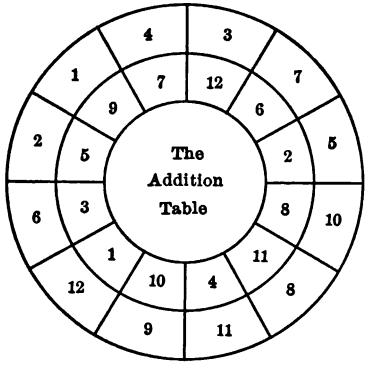
32	8 times 2 units are 16 units = 1 ten and 6 units.
8	8 times 3 tens are 24 tens.
256	24 tens + 1 ten are 25 tens.
	256 seats. *Answer.*

Multiply and test your work by addition :

2. 69 × 2	**3.** 79 × 2	**4.** 65 × 3	**5.** 78 × 3	**6.** 431 × 4
7. 82 × 4	**8.** 531 × 3	**9.** 263 × 3	**10.** 984 × 2	**11.** 782 × 3
12. 243 × 3	**13.** 45 × 6	**14.** 85 × 3	**15.** 873 × 2	**16.** 408 × 5
17. \$2.83 × 2	**18.** \$4.84 × 2	**19.** \$3.82 × 4	**20.** \$6.51 × 5	**21.** \$5.18 × 3
22. \$7.19 × 3	**23.** \$1.62 × 4	**24.** \$5.91 × 5	**25.** \$8.09 × 4	**26.** \$4.15 × 6
27. \$5.42 × 5	**28.** \$66.21 × 4	**29.** \$2.47 × 2	**30.** \$921 × 4	**31.** \$450 × 3
32. \$17.08 × 3	**33.** \$16.05 × 4	**34.** \$42.83 × 2	**35.** \$34.84 × 2	

1. 2×2+1	**2.** 3×6+4	**3.** 2×8+4	**4.** 4×9+5
3×2+1	5×4+3	6×5+3	8×4+3
2×5+3	6×6+4	5×5+1	4×4+5
3×4+2	7×3+2	3×9+3	3×3+6
5×3+2	4×6+4	7×4+3	7×2+3

5. 6×2+4	**6.** 8×5+6	**7.** 5×7+4	**8.** 5×7+6
3×8+5	6×5+3	6×8+3	4×3+5
2×6+5	4×2+5	9×3+5	3×8+3
9×2+4	5×4+4	2×9+4	6×4+5
4×8+3	8×4+3	5×5+3	6×3+1



Add each of the numbers in the outer ring to every number in the inner ring.

Subtract :

1. 813	**2.** 493	**3.** 290	**4.** 840	**5.** 237	**6.** 800
633	234	164	650	156	720

7. 931	**8.** 815	**9.** 790	**10.** 841	**11.** 126	**12.** 371
702	442	683	724	86	232

1. Add five 6's; add six 6's; add seven 6's; eight 6's; nine 6's; ten 6's; eleven 6's; twelve 6's. Learn the sums, and recite them, thus: Six 6's are ——, etc.

2. How many 6's in 30? How many 5's in 30? $30 \div 6 = ?$ $30 \div 5 = ?$

3. $30 = 6 \times$ ——; $30 = 5 \times$ ——; $7 \times 6 =$ ——; $42 \div 6 =$ ——; $42 \div 7 =$ ——.

4. How many 6's in 42? How many 7's in 42?

5. —— $= 6 \times 9$; $54 \div 6 =$ ——; $54 \div 9 =$ ——.

6. How many 6's in 54? How many 9's in 54? $\frac{1}{6}$ of $54 = ?$ $\frac{1}{9}$ of $54 = ?$

7. Eight 6's are ——; 6 eights are ——; $\frac{1}{6}$ of 48 = ——; $\frac{1}{8}$ of 48 = ——; $6 \times$ —— $= 48$; $8 \times$ —— $= 48$; there are —— 6's in 48; there are —— 8's in 48.

8. How many 6's in 60? How many 10's? $\frac{1}{6}$ of $60 = ?$ $\frac{1}{10}$ of $60 = ?$

9. There are 6 arithmetics in a package. How many arithmetics in 7 such packages? In 5, 6, 8, 10, 9 such packages?

10. If Arthur can walk 6 miles in a day, in how many days can he walk 24 miles? 36 miles? 42 miles?

11. 60 is how many 6's? What must we add to 60 to get eleven 6's? Twelve 6's?

12. $6 \times 11 =$ ——; $12 \times 6 =$ ——; $72 \div 6 =$ ——; $72 \div 12 =$ ——; $\frac{1}{6}$ of $72 =$ ——; $\frac{1}{11}$ of $66 =$ ——; $6 \times$ —— $= 66$; —— $\times 12 = 72$; $11 \times$ —— $= 66$.

13. Write the table of 6's through 6×12.

PROBLEMS OF SCHOOL

1. Indian Clubs for our physical training class were 25¢ a pair at the store. Instead of buying them, we asked the high school boys to make them in the school shop. The lumber cost 8¢ a pair. How much did we save on each pair? What did the lumber for 3 pairs cost? How many pairs could be made for 48¢?

2. There are eight grades in our school and the numbers of pupils in the different grades are 86, 78, 69, 83, 77, 62, 54, 46. How many pupils are there in all?

3. In the Jefferson school there are 865 pupils. 386 of them are boys. How many are girls?

4. It cost $413.78 to fit up the manual training shop in our school, and $643.29 to fit up the kitchen. The kitchen cost how much more than the shop?

5. It requires 23 tons of coal to heat our school building a month. How much does it cost at $7 a ton?

6. The boys in the Bancroft shop made 1579 toys which they sold before Christmas at 5 cents apiece. How much did they receive for 78 toys?

7. A class of 37 children rode on the car to the art gallery. How much was their fare one way at 5¢ apiece? How much for both ways?

8. The cost of our school is $59 a year for each child. How much does Ben's schooling for four years cost?

1. Mr. Beach sold 438 boxes of fruit last year. He sold 6 times as many boxes this year. How many boxes did he sell this year?

438	6 times 8 units = 48 units = 4 tens + 8 units.
6	6 times 3 tens = 18 tens.
2628	18 tens + 4 tens = 22 tens = 2 hundreds + 2 tens.
	6 times 4 hundreds = 24 hundreds.
	24 hundreds + 2 hundreds = 26 hundreds = 2 thousands + 6 hundreds. 2628. *Product.*

Find products and test your work by addition:

2. 341×6.	10. 376×6.	18. $\$8.90 \times 4$.
3. 79×6.	11. 207×6.	19. $\$359.87 \times 6$.
4. 88×6.	12. $\$18.06 \times 6$.	20. 385×6.
5. 72×6.	13. $\$15.21 \times 6$.	21. 706×6.
6. 537×6.	14. $\$14.06 \times 5$.	22. 395×6.
7. 169×6.	15. $\$.79 \times 4$.	23. 617×6.
8. 635×6.	16. $\$.93 \times 6$.	24. 534×6.
9. 249×6.	17. $\$2.18 \times 5$.	25. 729×6.

26. Six rows of peach trees, 58 in a row, are how many trees?

27. 219 tons of coal at \$6 a ton cost how much?

28. Find 4 times 763 by addition; by multiplication.

29. 653 × 3	32. 462 × 4	35. 325 × 5	38. 433 × 4	41. 529 × 6
30. 453 × 4	33. 632 × 3	36. 725 × 5	39. 634 × 4	42. 426 × 3
31. 405 × 6	34. 327 × 4	37. 309 × 3	40. 630 × 6	43. 743 × 5

1. Find in two ways the value of seven 7's; eight 7's; nine 7's; ten 7's. Write the multiplication table of 7's.

2. $7 \times 9 =$ ——; $7 \times 7 =$ ——; $7 \times 10 =$ ——.

3. 35 is the product of what two numbers? 56? 63? 70? 42? 49? 28? 21? 14?

4. $\frac{1}{7}$ of 70 = ——; $\frac{1}{7}$ of 49 = ——; $\frac{1}{7}$ of 63 = ——; $\frac{1}{7}$ of 28 = ——; $\frac{1}{7}$ of 35 = ——; $\frac{1}{7}$ of 56 = ——.

5. $11 \times 7 = ?$ How did you find it? $12 \times 7 = ?$

6. 8 is $\frac{1}{7}$ of what? 9? 11? 6? 7? 12? 5? 4?

7. How many 7's are there in 21? 35? 49? 70? 84? 63? 77? 56? 42? 28?

8. A schoolroom has 7 rows of desks with 8 in a row. How many desks in all? (Picture.)

9. If there were 42 desks in 6 rows, how many would there be in a row? (Picture.)

10. Seven boys gathered 49 quarts of nuts and shared them equally. How many quarts were there for each boy?

Written.

Multiply by 7:		*Multiply*	*Multiply*	*Multiply*
1. 32.	8. 84.	841	$29.12	$4.09
2. 45.	9. $2.90.	15. By 3.	21. By 2.	27. By 3.
3. 67.	10. $3.28.	16. By 4.	22. By 3.	28. By 4.
4. 53.	11. $.99.	17. By 5.	23. By 4.	29. By 5.
5. 86.	12. 548.	18. By 6.	24. By 5.	30. By 2.
6. 95.	13. 764.	19. By 7.	25. By 6.	31. By 6.
7. 123.	14. 196.	20. By 2.	26. By 7.	32. By 7.

1. The *multiplicand* and *multiplier* are **factors** of the *product.*

In $7 \times 9 = 63$, which is the product? Which are factors?

2. Name two factors of 21; 35; 15; 42; 63; 56; 44; 55; 77; 32; 40; 49; 48.

3. $4 \times \text{——} = 36$; $5 \times \text{——} = 60$; $4 \times \text{——} = 44$.

4. 7 is a factor of 28. What is the other factor?

5. *Answer the following without writing either question or answer:*

42×2	56×2	81×4	92×5	321×2
421×3	32×2	93×3	408×4	609×6

6. 3 is a factor of 15. What is the other factor?

7. 7 is a factor of 49. What is the other factor?

8. Harry set 40 cabbage plants in 4 equal rows. How many plants were set in each row?

Written.

Multiply by 3:	*Multiply by* 4:	*Multiply by* 6:	*Multiply by* 7:
9. 92.	**18.** 21.	**27.** 13.	**36.** 24.
10. 53.	**19.** 32.	**28.** 41.	**37.** 53.
11. 61.	**20.** 43.	**29.** 52.	**38.** 65.
12. 17.	**21.** 45.	**30.** 37.	**39.** 57.
13. 18.	**22.** 36.	**31.** 48.	**40.** 76.
14. 34.	**23.** 16.	**32.** 73.	**41.** 78.
15. 76.	**24.** 75.	**33.** 67.	**42.** 108.
16. 81.	**25.** 68.	**34.** 89.	**43.** 99.
17. 98.	**26.** 97.	**35.** 99.	**44.** 790.

Oral.

8	8	8
8	8	8
8	8	8
8	8	8
8	8	8
8	8	8
8	8	8
8	8	8
	8	8
		8

1. Add each column.
2. How many 8's are there in the first column? In the second? In the third?
3. Eight 8's are how many?
4. Nine 8's are how many?
5. Ten 8's are how many?
6. How many 8's are there in 64?
7. How many 8's are there in 72?
8. How many 9's are there in 72?
9. How many 8's are there in 80? How many 10's?
10. Find the sum of eleven 8's; of twelve 8's.
11. $8 \times 8 = ?$ $8 \times ? = 64.$ $\frac{1}{8}$ of $64 = ?$ $64 = \frac{1}{8}$ of $?$
12. $9 \times 8 = ?$ $8 \times ? = 72.$ $? \times 8 = 72.$ $? \times 9 = 72.$
13. $\frac{1}{8}$ of $72 = ?$ $\frac{1}{8}$ of $72 = ?$ $72 \div ? = 8.$ $72 \div 8 = ?$
14. Write the multiplication table of 8's.
15. Learn the multiplication table of 8's.

Written.

16. $42 \times 8.$	**26.** $304 \times 8.$	**36.** $415 \times 8.$
17. $83 \times 8.$	**27.** $601 \times 8.$	**37.** $98 \times 8.$
18. $48 \times 8.$	**28.** $490 \times 8.$	**38.** $506 \times 8.$
19. $70 \times 8.$	**29.** $580 \times 8.$	**39.** $198 \times 8.$
20. $39 \times 8.$	**30.** $800 \times 8.$	**40.** $207 \times 8.$
21. $87 \times 8.$	**31.** $819 \times 8.$	**41.** $639 \times 8.$
22. $65 \times 8.$	**32.** $706 \times 8.$	**42.** $119 \times 8.$
23. $92 \times 8.$	**33.** $615 \times 8.$	**43.** $577 \times 8.$
24. $89 \times 8.$	**34.** $909 \times 8.$	**44.** $705 \times 8.$
25. $99 \times 8.$	**35.** $115 \times 8.$	**45.** $354 \times 8.$

1. $369 + 483 + 754 + 96 + 9 = ?$

2. $432 \times 2 = ?$ $561 \times 2 = ?$ $823 \times 3 = ?$ $483 \times 3 = ?$

3. There are 144 pencils in a gross. How many are there in 2 gross?

4. Lucy gave 486 beads to Mabel and the same number to Sarah. How many did both receive?

Problem 5 is for strong pupils.

5. *a.* Some of our expenses for a year are:

Food	$462.23
Clothing	154.35
Doctor and Medicine	48.54
Taxes	61.08
Books and Papers	28.40
Fuel and Light	68.39
Total	

b. If our income is $1292.50, how much have we left?

c. How much is our income for 3 years?

d. What are these expenses for 2 years?

6. Albert has collected 191 postage stamps. Ralph has 5 times as many. How many has Ralph?

7. $237 + ? = 543$. $543 - ? = 237$. $306 + ? = 543$.

8. Find by addition twelve 5's; seven 4's; twelve 3's; four 8's; five 10's; four 11's; eleven 4's.

9. Find by subtraction how many 4's in 48; 7's in 35; 5's in 35; 4's in 32; 8's in 32.

10. Write the table of 2's to 2×12.

11. Write the table of 3's. 12. Write the table of 4's.

13. Write the table of 5's.

14. Cecil and his father made 239 cans of maple sirup in their Vermont sugar orchard. Each can held a gallon. They made how many quarts of sirup?

1. Write nine 9's in a column and add them. What is the sum? Nine 9's are how many?

2. Find the sum of ten 9's.

3. Ten times 9 are how many?

4. Write the table of 9's. Learn it.

5. $9 \times 9 = ?$ $81 \div 9 = ?$ $9 \times ? = 81.$ $81 \div ? = 9.$

6. $\frac{1}{9}$ of 81 = ? $\frac{1}{9}$ of ? = 9. 9 = $\frac{1}{9}$ of ?

7. $\frac{1}{9}$ of 90 = ? $\frac{1}{9}$ of ? = 10. 10 = $\frac{1}{9}$ of ?

8. Dick worked 9 hours at 9 cents an hour. How much did he earn? How many hours must he work to earn 90 cents?

9. Count by 9's from 0 to 108 and back.

10. Find eight 9's by adding. Name 2 factors of 72.

11. Add 8 to 64. How many 8's in 72? $8 \times ? = 72.$

12. $9 \times 10 = ?$ $9 \times 11 = ?$ $9 \times 12 = ?$ $9 \times ? = 108.$

13. 9 and 5 are factors of what number? 9 and 10? 9 and 11? 9 and 7? 9 and 9? 9 and 6?

14. When a product and one of its factors are given, how may you find the other factor?

15. $9 \times 8 = ?$ $9 \times 9 = ?$ $9 \times 10 = ?$ $9 \times 11 = ?$

16. How many 9's are there in 36? 54? 45? 63? 81?

17. How many 9's in 72? 90? 99?

18. Give the multiplication table of 9's; of 8's; of 7's; of 6's; of 5's; of 4's; of 3's; of 2's.

19. Give the missing factor:

108 = 9 × ——; 81 = 9 × ——; 63 = 9 × ——

2× 1= 2	3× 1= 3	4× 1= 4	5× 1= 5
2× 2= 4	3× 2= 6	4× 2= 8	5× 2=10
2× 3= 6	3× 3= 9	4× 3=12	5× 3=15
2× 4= 8	3× 4=12	4× 4=16	5× 4=20
2× 5=10	3× 5=15	4× 5=20	5× 5=25
2× 6=12	3× 6=18	4× 6=24	5× 6=30
2× 7=14	3× 7=21	4× 7=28	5× 7=35
2× 8=16	3× 8=24	4× 8=32	5× 8=40
2× 9=18	3× 9=27	4× 9=36	5× 9=45
2×10=20	3×10=30	4×10=40	5×10=50
2×11=22	3×11=33	4×11=44	5×11=55
2×12=24	3×12=36	4×12=48	5×12=60

6× 1= 6	7× 1= 7	8× 1= 8	9× 1= 9
6× 2=12	7× 2=14	8× 2=16	9× 2= 18
6× 3=18	7× 3=21	8× 3=24	9× 3= 27
6× 4=24	7× 4=28	8× 4=32	9× 4= 36
6× 5=30	7× 5=35	8× 5=40	9× 5= 45
6× 6=36	7× 6=42	8× 6=48	9× 6= 54
6× 7=42	7× 7=49	8× 7=56	9× 7= 63
6× 8=48	7× 8=56	8× 8=64	9× 8= 72
6× 9=54	7× 9=63	8× 9=72	9× 9= 81
6×10=60	7×10=70	8×10=80	9×10= 90
6×11=66	7×11=77	8×11=88	9×11= 99
6×12=72	7×12=84	8×12=96	9×12=108

10× 1= 10	11× 1= 11	12× 1= 12	ROMAN NUMERALS
10× 2= 20	11× 2= 22	12× 2= 24	
10× 3= 30	11× 3= 33	12× 3= 36	
10× 4= 40	11× 4= 44	12× 4= 48	I=1
10× 5= 50	11× 5= 55	12× 5= 60	V=5
10× 6= 60	11× 6= 66	12× 6= 72	X=10
10× 7= 70	11× 7= 77	12× 7= 84	L=50
10× 8= 80	11× 8= 88	12× 8= 96	C=100
10× 9= 90	11× 9= 99	12× 9=108	D=500
10×10=100	11×10=110	12×10=120	M=1000
10×11=110	11×11=121	12×11=132	$\overline{M}$=1,000,000
10×12=120	11×12=132	12×12=144	

NOTE. — Let this be a daily exercise of two or three minutes until learned perfectly. Place it on the blackboard *with answers* for study. Erase answers for oral recitation. Vary the combinations as experience indicates that other combinations than these are giving trouble.

1.	2.	3.	4.	5.
9×8	4×7	8×5	$7 + 8$	$6 + 7$
6×7	3×8	9×9	$9 + 6$	$5 + 9$
8×4	6×7	5×9	$8 + 5$	$6 + 5$
9×6	8×9	9×4	$7 + 9$	$6 + 8$
3×7	9×7	8×8	$9 + 8$	$5 + 7$

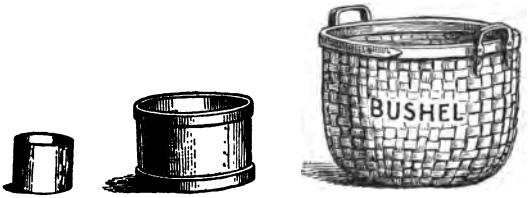
Written.

Find the products :

1.	2.	3.	4.	5.	6.
80	79	43	89	910	789
6	6	6	6	6	6
7.	**8.**	**9.**	**10.**	**11.**	**12.**
19	28	67	49	830	988
7	7	7	7	7	7
13.	**14.**	**15.**	**16.**	**17.**	**18.**
82	76	69	84	908	389
8	8	8	8	8	8
19.	**20.**	**21.**	**22.**	**23.**	**24.**
35	74	48	66	930	895
9	9	9	9	9	9

Multiply :

25.	26.	27.	28.	29.	30.
By 4	By 5	By 6	By 7	By 8	By 9
a. 656	*a.* 429	*a.* 394	*a.* 889	*a.* 180	*a.* 670
b. 729	*b.* 836	*b.* 987	*b.* 708	*b.* 719	*b.* 189
c. 408	*c.* 408	*c.* 842	*c.* 198	*c.* 667	*c.* 279
d. 396	*d.* 219	*d.* 986	*d.* 918	*d.* 809	*d.* 913
e. 886	*e.* 868	*e.* 308	*e.* 888	*e.* 198	*e.* 479
f. 949	*f.* 119	*f.* 191	*f.* 779	*f.* 769	*f.* 789



Quart Peck Bushel

NOTE 1. — These measures should stand before the class and be used by the pupils. Sawdust, oats, or any other light, dry material may be used to advantage.

NOTE 2. — In some parts of the country, particularly the West, the denominations of dry measure are not used, all dry commodities being bought and sold by weight, by the box, by the dozen, etc. In such communities, little time in school should be spent on dry measure.

1. Which measure is largest?

2. Which is next? 3. Which is smallest?

4. How many times do you think a bushel of oats would fill the peck measure? Try it and see.

5. How many quarts do you think would be needed to fill the peck measure? Try it and see.

6. How many quarts make a peck? How many pecks make a bushel?

7. Name some things that are measured with these measures.

8. *bu.* stands for bushel, *pk.* for peck, and *qt.* for quart. The dry quart is a little larger than the liquid quart. A half peck is how many dry quarts? How does it compare with a gallon?

1. A farmer raised 864 bushels of oats and sold half of them. How many bushels did he sell?

432 bushels	½ of 8 hundreds = 4 hundreds.
2)864 bushels	½ of 6 tens = 3 tens.
	½ of 4 units = 2 units. 432 bushels, *Answer.*

NOTE. — Some teachers prefer to write the quotient below the dividend. One form should be chosen and adhered to.

2. $2\overline{)426}$ **3.** $2\overline{)284}$ **4.** $2\overline{)648}$ **5.** $2\overline{)886}$ **6.** $3\overline{)936}$

7. $3\overline{)630}$ **8.** $4\overline{)884}$ **9.** $4\overline{)408}$ **10.** $5\overline{)550}$ **11.** $6\overline{)606}$

12. ½ of 660 = ? **13.** ⅓ of 933 = ? **14.** ¼ of 840 = ?

Dividend *Divisor* *Quotient*

15. 682 divided by 2 = 341.

The number divided is the **dividend.**
The number by which we divide is the **divisor.**
The result of division is the **quotient.**

Find the quotients :

DIVIDEND	DIVISOR	DIVIDEND	DIVISOR
16. 480	4	**17.** 606	6
18. 336	3	**19.** 505	5

20. Two hundred sixty-six pupils attend Grant school. There are just as many boys as girls. How many boys are there? How many girls?

cents	cents	cents
21. $4\overline{)448}$ cents	**24.** $3\overline{)933}$ cents	**27.** $2\overline{)228}$ cents
22. $4\overline{)\$4.48}$	**25.** $3\overline{)\$9.33}$	**28.** $2\overline{)\$2.28}$
23. 8446 ÷ 2	**26.** 6060 ÷ 3	**29.** 6060 ÷ 6

Oral.

1. Count by 7's to 84; by 8's to 96; by 9's to 108.

2. What two factors make 36? 44? 55? 48? 64? 72?

3. The product of two numbers is 56. One of them is 7. What is the other?

4. A two-bushel bag will hold how many pecks?

5. 36 pecks of apples will fill how many bushel crates?

6. A quart is what part of a peck?

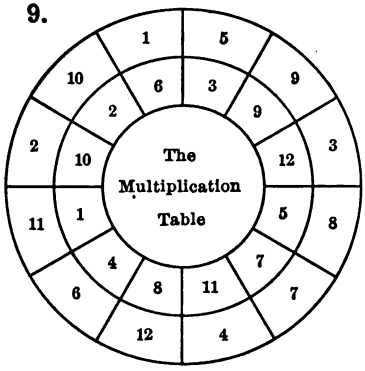
7. What will a peck of nuts cost at 9 ¢ a quart?

8. *Answer at sight:*

$2\overline{)486}$ $3\overline{)933}$ $4\overline{)880}$ $5\overline{)105}$ $6\overline{)660}$

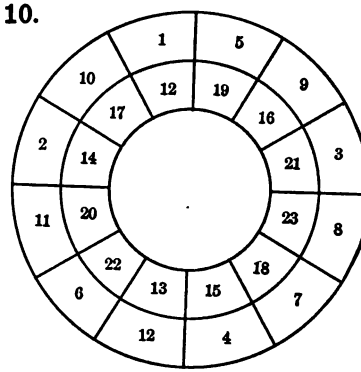
$$\begin{array}{rrrrrrr} 986 & 323 & 249 & 86 & 405 & 422 & 622 \\ -\,475 & +\,921 & +\,120 & -\,24 & \times 4 & \times 3 & \times 3 \end{array}$$

9.



Multiply every number in the outer ring by each number in the inner ring.

10.



Subtract each number in the outer ring from every number in the inner ring.

1. *See how quickly you can get these :*

a.	*b.*	*c.*	*d.*	*e.*
169	980	\$4.07	691	396 pk.
× 6	× 7	× 8	− 384	× 8

2. If a sleeping car is 69 ft. long, how long is a train of 9 such cars?

3. Seven coal trains have 47 cars on each train. How many cars in all?

4. If each car carries 36 tons of coal, how many tons are carried by 9 cars?

5. Copy this diagram. Wherever a column and a line cross each other, write the product of the numbers given at the top of the column and at the left of the line; as, $10 \times 8 = 80$; $4 \times 5 = 20$.

	1	2	3	4	5	6	7	8	9	10	11	12
1												
2												
3												
4												
5				20								
6												
7												
8												
9												
10								80				
11												
12												

Oral :

1. How many 2's in 5, and how many over? In 7? In 11? In 19?

2. How many 3's in 8, and how many over? In 11? In 16? In 14? In 22?

3. How many 4's in 23, and how many over? In 33? In 15? In 21? In 38?

4. In 47 there are —— 5's and —— over. Recite in the same way about 16; 23; 39; 18; 46; 33.

5. Tell how many 9's and how many over in 11; 46; 87; 39; 43; 86; 98; 53; 69; 76; 49.

The number left over when the dividend does not exactly contain the divisor is called the **remainder.**

Dividend	*Divisor*		*Quotient*	*Remainder*	
26 ÷	6	=	4 and	2 over	
Test :	6 ×	4 +		2 = 26	*Dividend*

6. *Divide each of the following numbers by* 2, 3, 4, 5, 6, 7, 8, *and* 9, *and test your answers as above :*

14	38	23	30	19	13	11	17	28
29	15	10	8	24	31	26	39	35

7. *Divide each of the following numbers by* 5, 6, 7, 8, *and* 9, *and test your answers :*

52	49	55	42	46	50	59	61	41
45	53	57	60	48	56	47	54	58

8. *Divide each of the following numbers by* 7, 8, *and* 9, *and test your answers :*

75	67	65	70	73	74	66	63	76

1. $8\overline{)512}$ 64 *Quotient*; 48 tens; 32 units

PROCESS

5 does not contain 8; 5 hundreds and 1 ten make 51 tens; 51 tens divided by 8 equals 6 tens and 3 tens over; 3 tens and 2 units make 32 units. 32 divided by 8 = 4. 64, *Quotient.*

The figures and words below the dividend may be omitted, and the work expressed thus $8\overline{)512}$ 64 *Quotient* or $8\overline{)512}$ 64 *Quotient*

2. Find $\frac{1}{3}$ of 81; 168; 261; 195; 1488.

How can you test your work? The quotient and divisor are what of the dividend?

3. Find the number of gallons in 236 qt.; 148 qt.; 112 qt.; 244 qt.; 216 qt.; 944 qt.; 2324 qt.

4. How many school weeks in 165 school days? 245 school days? 445 school days? 625 school days?

5. Lucy's father worked 348 days. How many weeks did he work?

6. *a.* $4\overline{)232}$ *b.* $3\overline{)441}$ *c.* $4\overline{)652}$

d. $5\overline{)335}$ *e.* $5\overline{)2410}$ *f.* $3\overline{)720}$

Find the quotients and test your work by multiplication :

7. $\frac{1}{3}$ of 39; of 51; of 57; of 69; of 102.

8. $\frac{1}{4}$ of 56; of 72; of 84; of 112.

9. $\frac{1}{5}$ of 65; of 80; of 140; of 145.

10. $\frac{1}{6}$ of 78; of 102; of 120; of 168.

11. $\frac{1}{7}$ of 91; of 119; of 175; of 189.

12. $\frac{1}{4}$ of 104; of 152; of 184; of 200.

1. Frank bought 9 packages of seeds at 5¢ a package. How much did they cost?

2. He planted six rows of corn with 11 hills in a row. How many hills did he plant?

3. Frank sold the corn at 3 cents an ear. How much did he receive for one dozen ears?

4. Frank received 48 cents for a dozen cucumbers. That was how much apiece?

5. Mrs. Lewis paid Frank 56 cents for seven cabbages. That was how much apiece?

6. Frank set out 90 strawberry plants. One tenth of them died. How many died? How many lived?

7. Ruby sold 10 bouquets of sweet peas at 5¢ apiece. How much did she receive?

8. She raised 24 geraniums from slips and sold them at $1 a dozen. How much did they bring?

9. Ruby bought a dozen pansy plants for 25 cents. She gave the florist a silver dollar. How much change did she receive?

10. She sold 11 bunches of pansies for 5¢ apiece. How much did she receive?

1. *Divide by* 3:
36; 24; 15; 18; 21; 27; 24; 39; 42.

2. *Divide by* 4:
36; 24; 40; 20; 32; 44; 48; 28; 52.

3. *Divide by* 5:
20; 25; 45; 50; 35; 60; 40; 55; 65.

4. *Divide by* 6:
48; 24; 54; 42; 18; 72; 60; 30; 120.

5. *Divide by* 7:
21; 84; 70; 56; 35; 77; 42; 49; 98.

6. *Divide by* 8:
48; 80; 56; 64; 96; 88; 40; 72.

7. *Divide by* 9:
81; 72; 54; 45; 36; 90; 108; 63.

8. A bushel of cranberries cost \$3.52. What was the cost of a peck? ($\frac{1}{4}$ of 352 cents.)

9. Give two factors whose product is 12; 24; 18; 21; 36; 42; 84; 108; 72; 81; 56; 63.

10. Find by addition and multiplication: three 7's; four 8's; five 5's; three 12's.

11. A card of buttons contains six rows, six buttons in a row. How many buttons in all?

12.

2	3	5	8	7	10	6	9	4	12	1	11
11	6	2	10	3	1	4	7	12	9	5	8

Multiply each number in the upper row by every number in the lower row.

1. $3\overline{)552}$ **2.** $4\overline{)164}$ **3.** $6\overline{)738}$ **4.** $3\overline{)222}$ **5.** $8\overline{)336}$

6. $5\overline{)400}$ **7.** $6\overline{)336}$ **8.** $5\overline{)785}$ **9.** $7\overline{)287}$ **10.** $5\overline{)670}$

11. $4\overline{)816}$ **12.** $6\overline{)378}$ **13.** $7\overline{)245}$ **14.** $3\overline{)267}$ **15.** $8\overline{)432}$

16. $5\overline{)575}$ **17.** $4\overline{)356}$ **18.** $5\overline{)635}$ **19.** $5\overline{)490}$ **20.** $6\overline{)804}$

21. Four boys bought a boat for $140. How much did each pay?

22. 185 books were put on 5 shelves How many were put on each shelf?

23. A room has 7 rows of chairs with 19 chairs in each row. How many chairs in the room? (Picture.)

24. *Multiply by* 3:
28; 65; 47; 124; 253; 769; 483; 204; 910.

25. *Multiply by* 4:
49; 385; 769; 428; 349; 206; 908; 839.

26. *Multiply by* 5:
563; 721; 432; 86; 742; 938; 701; 650.

27. *Multiply by* 6:
432; 591; 284; 315; 38; 409; 840.

28. *Multiply by* 7:
63; 40; 48; 39; 415; 230; 408; 916.

29. *Multiply by* 8:
41; 13; 76; 83; 44; 715; 403; 936.

30. *Multiply by* 9:
21; 42; 35; 40; 123; 235; 368; 987.

31. *Divide by 7 and test your work:*
105; 154; 392; 469; 595; 651; 623.

1. $.20 for 4 oranges is how much apiece?

2. A half dollar, 2 quarters, a dime, and 2 nickels are how much money?

3. How much will I have left out of $32 after buying a coat for $11?

4. Four dolls at $.15 apiece cost how much?

5. Three dimes will buy how many bananas at 3¢ apiece?

6. Bananas at $.48 a dozen are how much apiece?

7. From a rope 24 ft. long, Joe cut 8 ft. for a jumping rope and 7 ft. for hammock ropes. How many feet were cut off? How many feet were left?

8. If mother needs 2 dozen buttons for Grace's dress and has 17 buttons, how many must she buy?

Written.

1. Mr. McGregor's garden is 144 feet long and 84 feet wide. Draw a picture of it. (*a*) How many yards long is it? (*b*) How many yards wide? (*c*) How many feet of fence are needed to inclose it?

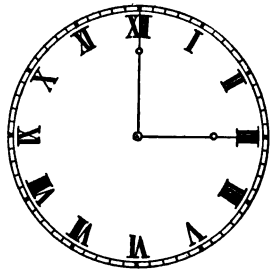
2. Mr. McGregor bought a wheelbarrow for $4.75, a spading fork for 95 cents, 4 sacks of fertilizer for $3.70, a rake for 60 cents, a hoe for 40 cents, and a spraying pump for $5.12. How much did he pay for all?

3. In this garden Mr. McGregor raised 242 pounds of beets, 849 pounds of potatoes, 386 pounds of tomatoes, 74 pounds of turnips, 306 pounds of cabbage, and 89 pounds of onions. How much did all of these vegetables weigh?

1. *Multiply each of these numbers by* 7, 8, 9, *and* 10:
   a. 37; 36; 31; 35; 33; 32; 38; 39.
   b. 63; 65; 64; 62; 68; 61; 69; 66.
   c. 84; 82; 85; 89; 81; 88; 87; 80.
   d. 93; 94; 95; 96; 97; 99; 98; 91.
2. Find $\frac{1}{8}$ of 104; 120; 168; 184; 200.
3. Find $\frac{1}{9}$ of 117; 135; 189; 207; 225.

Find quotients and remainders. Test your work.

4. *Divide by* 3: 41; 46; 49; 53; 79; 94.
5. *Divide by* 4: 53; 62; 70; 74; 106; 138.
6. *Divide by* 5: 78; 94; 102; 118; 123.
7. *Divide by* 6: 81; 93; 99; 110; 136.
8. *Divide by* 7: 95; 115; 120; 145.
9. *Divide by* 8: 108; 124; 138; 165.
10. *Divide by* 9: 121; 138; 156; 187.
11. Lewis's hens laid 154 eggs in a week. That was how many eggs a day?
12. What did John receive for mowing a lawn 9 times at 25 cents for each time?
13. Mr. Jarvis bought a new automobile for $850. The dealer took Mr. Jarvis's old car in part payment, allowing him $275 for it. How much money did Mr. Jarvis have to pay?
14. How many weeks in 161 days? 245 days? 448 days? 623 days? 497 days? 945 days?
15. $8\overline{)232}$ $9\overline{)441}$ $7\overline{)651}$ $5\overline{)335}$ $5\overline{)2410}$ $9\overline{)1107}$
16. 426 is: *a.* $\frac{1}{7}$ of what number? *b.* $\frac{1}{8}$ of what?



1. Which is the hour hand? Which is the minute hand? What is the other hand?

To what number does the hour hand point? The minute hand?

How many hour spaces are there on the dial? How many hours is it from noon to midnight? From midnight to noon? How many hours in a whole day?

2. How long does it take the minute hand to go around the dial? How many minute spaces between XII and I? Between X and XI? How many minute spaces on the whole dial? How many minutes make an hour?

3. How many times will the minute hand pass around the dial between 12 o'clock and 1 o'clock? Between 12 and 4? Between 2 and 5? Between 4 and 9?

How many minutes are there in 2 hours? In 7 hours?

4. The second hand passes around the circle once every minute. How many seconds make a minute?

Summary

60 seconds (sec.) make 1 minute
60 minutes (min.) make 1 hour
24 hours (hr.) make 1 day (da.)

5. When the minute hand reaches VI, where will the hour hand be? What time will it be?

1. Mr. Carpenter bought 601 pounds of nails. After he had used 263 pounds, how many pounds were left?

601 243 358	Three units from 11 units leave 8 units. We cannot say, "4 tens from 10 tens," because 1 ten has been used to make 10 units. So we say, "4 tens from 9 tens leave 5 tens." 2 hundreds from 5 hundreds leave 3 hundreds. 358 pounds. *Answer.*

Subtract:

2.	600 143	**3.**	600 241	**4.**	600 315	**5.**	600 325	**6.**	600 237	**7.**	600 116
8.	700 143	**9.**	700 241	**10.**	700 415	**11.**	700 345	**12.**	700 732	**13.**	700 385
14.	800 385	**15.**	800 425	**16.**	800 563	**17.**	800 738	**18.**	800 746	**19.**	800 633
20.	300 126	**21.**	300 226	**22.**	300 135	**23.**	300 184	**24.**	300 193	**25.**	300 290
26.	500 351	**27.**	500 250	**28.**	500 450	**29.**	500 139	**30.**	500 291	**31.**	500 188
32.	900 243	**33.**	800 638	**34.**	700 490	**35.**	300 127	**36.**	900 534	**37.**	200 132
38.	400 189	**39.**	400 286	**40.**	500 291	**41.**	900 789	**42.**	600 419	**43.**	700 509

NOTE. — Some teachers prefer: 3 and 8 (writing 8) are 11; 5 (carrying 1 to 4) and 5 (writing 5) are 10; 3 (carrying 1 to 2) and 3 (writing 3) are 6.

Make change for the following amounts :

1. 25 ¢ from $2.00.
2. 90 ¢ from $1.00.
3. 35 ¢ from 50 ¢.
4. 30 ¢ from 50 ¢.
5. 80 ¢ from $1.00.
6. 15 ¢ from $1.00.
7. 18 ¢ from 25 ¢.
8. 33 ¢ from 50 ¢.
9. 9 ¢ from 25 ¢.
10. $1.25 from $2.00.
11. $3.00 from $10.00.
12. $4.75 from $5.00.

Prices at the Market

Butter, 42¢ a pound	Lettuce, 2 heads for 15¢
Cheese, 30¢ a pound	Onions, 3 bunches for 10¢
Oranges, 45¢ a dozen	Potatoes, 12 pounds for 25¢
Pineapples, 15¢ apiece	Radishes, 2 bunches for 5¢
Asparagus, 9¢ a bunch	Berries, 18¢ a box
Peanuts, 10¢ a pound	Bananas, 30¢ a dozen

Find the cost of :

1. A pound of butter and 3 bunches of onions.
2. Two pineapples.
3. A dozen oranges and 2 bunches of radishes.
4. A box of berries and 2 heads of lettuce.
5. A bunch of asparagus and ½ pound of cheese.

NOTE. — Have children make and solve many problems. Appoint a boy and a girl to obtain present prices and copy on blackboard.

Add :

1.	2.	3.	4.	5.
324	685	487	933	8345
65	99	591	848	796
709	498	380	696	384
83	176	748	404	9565
427	390	631	79	3872
986	508	217	938	4033
45	657	50	254	5938

Subtract :

6.	7.	8.	9.	10.
700	200	589	438	4600
384	181	398	279	1376

11.	12.	13.	14.	15.
900	450	735	888	3327
357	189	607	499	1509

Multiply :

16.	17.	18.	19.	20.
483	967	382	790	4896
4	5	6	7	8

21.	22.	23.	24.	25.
403	589	763	469	3594
9	9	8	7	9

Divide :

26. $4\overline{)688}$	**27.** $4\overline{)332}$	**28.** $4\overline{)872}$	**29.** $4\overline{)156}$
30. $4\overline{)9100}$	**31.** $5\overline{)435}$	**32.** $5\overline{)685}$	**33.** $5\overline{)725}$
34. $5\overline{)635}$	**35.** $5\overline{)8795}$	**36.** $6\overline{)5142}$	**37.** $6\overline{)5124}$
38. $6\overline{)7872}$	**39.** $7\overline{)4578}$	**40.** $7\overline{)3801}$	**41.** $5\overline{)6855}$
42. $9\overline{)3807}$	**43.** $9\overline{)4563}$	**44.** $9\overline{)6102}$	**45.** $9\overline{)18108}$

1. Last year the pupils of our school sold 3897 Red Cross seals. This year we sold 5296. How many more did we sell this year than last year?

5296 3897 1399 *Rem.*	After we have taken 1 ten from 9 tens in the minuend, how many tens are left? We cannot take the 9 tens in the subtrahend from the 8 tens left in the minuend, so what must we do?

Test all of your work. The subtrahend + the remainder = ?

Subtract:

2. 842 647	**3.** 435 238	**4.** 583 245	**5.** 694 598	**6.** 803 654	**7.** 715 678
8. 5643 2738	**9.** 4521 2618	**10.** 3462 2548	**11.** 3573 1628		
12. 6411 2508	**13.** 5343 2517	**14.** 4701 2654	**15.** 3603 1672		
16. 5007 2548	**17.** 3541 2496	**18.** 4504 1576	**19.** 4791 2432		
20. $421.35 143.29	**21.** $846.30 298.41	**22.** $6937.15 486.29	**23.** $2341.17 1935.48		
24. 1240 1199	**25.** 1237 983	**26.** $439.21 248.41	**27.** 8435 6598	**28.** 4605 2719	

29. How much added to $436 will make $1321?

30. In the year 1912 Mr. Finch had $4378 in the bank. In 1918 he had $5247. How much did he save in that time?

Can you get the first five right in two minutes? Write only the answers.

1.	2.	3.	4.	5.
403	$12.50	419	576	$2\overline{)8642}$
516	1.35	− 263	× 9	
940	6.23			
768	1.79			
24	7.00			

6.	7.	8.
708	375	467
× 7	× 9	× 6

9. A peddler's sales for a week are: Monday, $6.18; Tuesday, $4.23; Wednesday, $7; Thursday, $16.85; Friday, $3.98; Saturday, $27.39. *a.* Find the total for the week. *b.* At the same rate, what would be the total for 9 weeks? *c.* For 7 weeks? *d.* For 8 weeks?

10. If a steamboat goes 512 miles in a day, how far will it go in 6 days?

11.	12.	13.	14.
$42.10	$39.24	$18.19	$4.93
× 6	× 5	× 4	× 3

15. The subtrahend is $375.39, the minuend $483.29. Find the remainder.

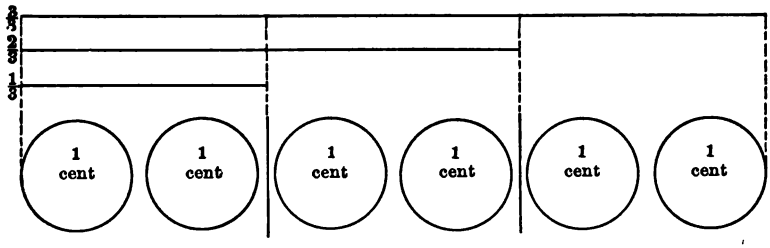
16. What is the difference between 4325 and 8113?

Subtract:

17.	18.	19.	20.	21.
5462	2000	4605	$30.06	2741
2735	729	2719	12.74	659

22. A train of 9 cars has 79 passengers in each car. How many passengers in all the cars?

23. An ocean steamer can carry 789 passengers at each trip. How many can she carry in 7 trips?



NOTE. — This lesson is not intended to teach fractions. It is merely an application of multiplication and division.

1. Here are how many cents? $\frac{1}{3}$ of 6 cents = 2 cents. $\frac{2}{3}$ of 6 cents = 2 × 2 cents = —— cents.

2. Draw 12 cents. Find $\frac{1}{3}$ of 12 ¢; $\frac{2}{3}$ of 12 ¢.

3. Draw a line 20 in. long. Find $\frac{1}{4}$ of 20 in.; $\frac{2}{4}$ of 20 in.; $\frac{3}{4}$ of 20 in.; $\frac{1}{5}$ of 20 in.; $\frac{2}{5}$ of 20 in.; $\frac{4}{5}$ of 20 in.

4. Draw a line 1 yd. long. Mark the inches. $\frac{1}{4}$ yd. is —— inches; $\frac{2}{4}$ yd. = —— in.; $\frac{3}{4}$ yd. = —— in.

5. $\frac{1}{3}$ of a yard is —— inches; $\frac{2}{3}$ yd. = —— in.

6. $\frac{1}{6}$ of a yard is —— inches; $\frac{5}{6}$ yd. = —— in.

7. Picture 10 marbles. Mark off $\frac{1}{5}$ of 10 marbles; $\frac{4}{5}$.

8. $\frac{2}{5}$ of 10 marbles are —— marbles; $\frac{3}{5}$ of 10 marbles are —— marbles; $\frac{4}{5}$ of 10 marbles are —— marbles.

9. How many eggs in $\frac{2}{3}$ of a dozen? $\frac{3}{4}$ of a dozen?

10. A pie is worth 20 cents. What is $\frac{1}{4}$ of it worth? $\frac{2}{4}$? $\frac{3}{4}$? $\frac{1}{5}$? $\frac{3}{5}$? $\frac{4}{5}$? Make two pictures of the pie. Cut one into fourths, the other into fifths.

11. How many hours in $\frac{3}{4}$ of a day? $\frac{2}{3}$? $\frac{5}{6}$? $\frac{3}{8}$? $\frac{5}{8}$? $\frac{7}{8}$?

12. If you are awake $\frac{2}{3}$ of the time, you are awake how many hours each day? How many hours do you sleep?

1. Mr. Wise had \$9492 in the bank. He paid $\frac{5}{7}$ of it for a farm. What did the farm cost?

7)9492
1356 or $\frac{1}{7}$ of \$9492
$\times 5$
6780 or $\frac{5}{7}$ of \$9492. \$6780. *Answer.*

We first find $\frac{1}{7}$ of \$9492, then $\frac{5}{7}$ of \$9492.

NOTE. — This work is not intended to teach fractions. It is merely a good form of practice in multiplication and division. In a problem like this, it is more convenient to write the quotient *below* the dividend.

Find:

2. $\frac{5}{7}$ of 371.
3. $\frac{2}{3}$ of 2520.
4. $\frac{3}{4}$ of 748.
5. $\frac{2}{5}$ of 6755.
6. $\frac{3}{5}$ of 8415.
7. $\frac{1}{2}$ of 3758.
8. $\frac{3}{7}$ of 623.
9. $\frac{3}{8}$ of 7120.
10. $\frac{4}{9}$ of 342.
11. $\frac{5}{6}$ of 324.
12. $\frac{5}{6}$ of 8394.
13. $\frac{5}{8}$ of 2096.
14. $\frac{3}{8}$ of 7128.
15. $\frac{7}{9}$ of 7236.
16. $\frac{7}{8}$ of 6336.
17. $\frac{3}{5}$ of 4330.
18. $\frac{4}{9}$ of 639.
19. $\frac{8}{9}$ of 1458.
20. $\frac{2}{3}$ of 8649.
21. $\frac{5}{9}$ of 4365.
22. $\frac{3}{4}$ of 4628.

23. Mrs. French bought 96 pounds of flour and used $\frac{3}{8}$ of it. How many pounds did she use?

24. Charlie's hens laid 245 eggs in one month. His mother bought $\frac{2}{5}$ of them. How many eggs did she buy?

25. Jessie bought $\frac{7}{8}$ of a yard of cloth at 96 cents a yard. What did she pay for it?

26. We had 189 days of school last year. Harold was absent $\frac{2}{9}$ of the time on account of travel. How many days of school did Harold miss?

1. $20 + 10$	**2.** $40 + 20$	**3.** $20 + 70$	**4.** $40 + 50$
$30 + 10$	$40 + 30$	$20 + 80$	$60 + 40$
$20 + 20$	$50 + 20$	$20 + 90$	$70 + 40$
$30 + 30$	$60 + 20$	$50 + 30$	$50 + 80$
$30 + 20$	$70 + 10$	$30 + 60$	$90 + 60$
5. $70 - 20$	**6.** $80 - 40$	**7.** $60 - 40$	**8.** $50 - 30$
$90 - 10$	$90 - 30$	$70 - 50$	$70 - 60$
$50 - 20$	$70 - 10$	$30 - 20$	$90 - 40$
$30 - 10$	$60 - 20$	$80 - 50$	$70 - 40$
$60 - 30$	$90 - 80$	$90 - 60$	$80 - 20$
9. 10×8	**10.** 30×4	**11.** 50×7	**12.** 6×20
20×2	50×3	60×8	3×80
60×3	70×3	30×6	5×90
40×5	60×2	40×9	2×60
70×2	90×4	80×2	7×30
13. $25 + 10$	**14.** $16 + 40$	**15.** $39 + 10$	**16.** $76 + 20$
$45 + 20$	$27 + 30$	$84 + 10$	$24 + 50$
$35 + 30$	$58 + 20$	$21 + 30$	$19 + 80$
$65 + 10$	$85 + 10$	$35 + 20$	$72 + 20$
$35 + 20$	$17 + 40$	$42 + 30$	$61 + 30$
17. $26 - 10$	**18.** $73 - 50$	**19.** $89 - 50$	**20.** $83 - 50$
$42 - 10$	$84 - 20$	$72 - 40$	$79 - 20$
$83 - 20$	$96 - 30$	$99 - 70$	$92 - 80$
$56 - 30$	$88 - 50$	$83 - 40$	$61 - 30$
$27 - 10$	$79 - 60$	$64 - 50$	$82 - 60$
7×90	8×40	6×70	2×80

1. *Add* 2, 3, 4, 5, 6, 7, 8, 9 *to each of the following numbers:*

a.	*b.*	*c.*	*d.*	*e.*	*f.*	*g.*	*h.*	*i.*
57	19	55	72	74	58	26	77	82
44	69	98	42	35	68	37	56	53
52	74	75	83	54	38	49	89	62
64	15	66	46	17	36	28	48	96
85	105	63	88	87	73	16	92	93
59	18	47	76	39	45	67	78	27
86	29	99	84	65	95	79	25	97

2. *Subtract* 2, 3, 4, 5, 6, 7, 8, 9, *from each number.*

3. Pupils in turn add columns aloud, one pupil writing the sums on the blackboard.

4.
$$\begin{cases} 65 + 27 = ? \\ 65 + 20 = 85. \\ 85 + \ 7 = 92 \ \textit{Answer.} \end{cases}$$
Say, 65, 85, 92.

In the same way give the sums of the following:

5. $24 + 25$. **8.** $85 + 16$. **11.** $58 + 45$. **14.** $81 + 19$.

6. $38 + 43$. **9.** $37 + 58$. **12.** $43 + 59$. **15.** $59 + 21$.

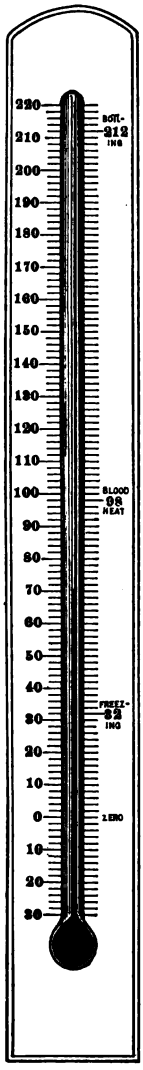
7. $72 + 19$. **10.** $23 + 34$. **13.** $64 + 27$. **16.** $58 + 34$.

17.
$$\begin{cases} 65 - 27 = ? \\ 65 - 20 = 45 \\ 45 - \ 7 = 38 \ \textit{Answer.} \end{cases}$$
Say, 65, 45, 38.

18. $72 - 19$. **21.** $76 - 29$. **24.** $82 - 44$. **27.** $45 - 18$.

19. $85 - 16$. **22.** $93 - 37$. **25.** $91 - 23$. **28.** $37 - 19$.

20. $63 - 25$. **23.** $64 - 35$. **26.** $78 - 31$. **29.** $92 - 78$.



1. The degree of heat that anything has is called its *temperature*. What is it that measures temperature? When the liquid in the thermometer rises, is it growing warmer or colder? When the liquid goes down?

2. Find zero (0) on this thermometer. What temperature does this thermometer show now?

3. Find the freezing point. That is how many degrees above zero? It is how many degrees below the boiling point?

4. When the thermometer out of doors shows 10 degrees (10°) below zero, what is the season? What is the season when it shows 90 degrees (90°) above zero?

5. When it is 49° above zero at sunrise and 18° higher at noon, what is the temperature at noon?

6. When water is at 58°, how many degrees must it be heated before it boils?

7. The temperature of the body is 98° above 0. It is how many degrees above the freezing point?

8. Look at the schoolroom thermometer and tell how warm the room is. It is how much cooler than your body?

NOTE. — Give many more exercises using the schoolroom thermometer in various locations. The room should be at 68° to 70°.

1. Mr. Clark sold seven sacks of potatoes for $8.05. How much per sack did he receive?

$7)\$8.05$

$\$1.15$ *Answer.*

We really divide 805 cents by 7. The quotient is 115 cents, or $1.15. So we may divide any number of dollars and cents as though it were a number of cents with the decimal point omitted. We place the decimal point of the quotient directly *over* the decimal point of the dividend. (Or under when the quotient is written below.)

Divide and test your work by multiplication :

2. $\$3.48 \div 2$.	**11.** $\$9.44 \div 8$.	**20.** $\$83.30 \div 2$.
3. $\$8.96 \div 4$.	**12.** $\$8.96 \div 8$.	**21.** $\$74.67 \div 3$.
4. $\$4.25 \div 5$.	**13.** $\$23.04 \div 8$.	**22.** $\$65.32 \div 4$.
5. $\$6.36 \div 6$.	**14.** $\$35.86 \div 8$.	**23.** $\$83.55 \div 5$.
6. $\$8.46 \div 6$.	**15.** $\$49.12 \div 8$.	**24.** $\$63.78 \div 6$.
7. $\$14.34 \div 6$.	**16.** $\$9.81 \div 9$.	**25.** $\$39.69 \div 7$.
8. $\$12.04 \div 7$.	**17.** $\$10.35 \div 9$.	**26.** $\$48.64 \div 8$.
9. $\$13.23 \div 7$.	**18.** $\$15.21 \div 9$.	**27.** $\$37.53 \div 9$.
10. $\$9.45 \div 7$.	**19.** $\$47.34 \div 9$.	**28.** $\$9.09 \div 9$.

29. Five boys shared equally $1.25 which they received for removing the rubbish and weeds from a vacant lot. What was Albert's share?

30. It costs $4.14 a week to furnish gasoline for Mr. Ray's delivery truck. How much a day does it cost? (Six working days in a week.)

QUICK MENTAL TEST

Teacher dictate questions. Pupils write answers. Exchange papers, mark them, and make report.

1. How many months are there in 11 years?

2. $\frac{1}{4}$ of a day is how many hours?

3. On what number is the minute hand at 20 minutes past two?

4. How many seconds are there in $\frac{1}{5}$ of a minute?

5. At 20 ¢ a gallon, what will 1 qt. of milk cost?

6. I gave the clerk a silver dollar in payment for 7 qt. of cherries at 12 ¢ a quart. What was the change?

7. Oats at 48 ¢ a bushel are how much a peck?

8. Hickory nuts at 5 ¢ a quart are how much a peck?

9. How many pints are there in 11 gallons?

10. How many days are there in 12 weeks?

Oral.

1. From 100 subtract 30; 20; 50; 80; 10; 70; 40.

2. $65-28 = ?$ (Say, 65, 45, 37.)

3. $84-28$. 4. $93-54$. 5. $59-29$. 6. $83-26$.

7. $76-37$. 8. $46-38$. 9. $81-17$. 10. $48-29$.

11. $49\times10=$——; $73\times100=$——; $8\times1000=$——.

12. How many dresses will 36 yd. of silk make if 9 yd. will make one dress?

13. 3 dozen eggs cost \$.99. One dozen costs ——.

14. How many minutes in 8 hours? In 7 hours?

Oral.

Add, beginning with the last number. In adding the first column, say, 49, 52, 59, 64, 70, *etc.*

1.	2.	3.	4.	5.	6.
7	8	4	9	3	4
8	6	2	3	5	8
6	3	7	8	9	7
5	1	9	6	8	9
7	9	6	5	6	6
3	4	3	7	1	9
49	38	24	35	39	53

Written.

Subtract and test by addition :

7.	8.	9.	10.	11.
987	408	763	835	893
789	309	465	754	495

Add and test by multiplication :

12.	13.	14.	15.	16.
66	98	47	387	1235
66	98	47	387	1235
66	98	47	387	1235
66	98	47	387	1235
66	98	47	387	1235
66	98	47	387	1235
66	98	47	387	1235

Divide and test by multiplication :

17. 3)$4.53 **18.** 5)$2.85 **19.** 6)$15.24 **20.** 4)$73.28

21. 8)5944 **22.** 9)3789 **23.** 8)7168 **24.** 9)8172

USED BY 3A TEACHERS

1. For drill on multiplication and division tables:

$5 \times ? = 20$	30	40	50	35	15	45	25	55	10
$6 \times ? = 18$	54	24	12	60	72	48	42	66	30

Teacher points to product and pupil gives the other factor.

2. Relay race: Choose 2 rows, same number of children in each row. The children in the 2 front seats leave their seats at the same time and run to the blackboard. Each child begins to write one of the tables; *e.g.* $6 \times 1 = 6$, then runs back to his seat. As soon as either child is in his seat, the one behind him runs to the board and writes $6 \times 2 = 12$. This is continued until the table of 6's is finished. The row finishing first wins. Then two other rows try new table.

3. Have children select the numbers from 1 to 10, from 10 to 20, etc., that are multiples which come in any of their tables, then give the factors of those numbers.

4. Place drawing of a snow fort on the board, and upon it write figures from 1 to 12, but not in succession. On the flag write the multiplier. Children hit the fort as many times as they give correct answer.

5. A race to win 10's. Children at seats with paper and pencil. Teacher directs them to solve a problem in the arithmetic or one she places on the board. When done, teacher inspects it, gives pupil a 10 if correct. Child at once begins work on another problem selected by teacher. Whoever receives most tens wins.

6. Child in front of class is asked a question by each of the others in class. If he answers all correctly, he may choose another to take his place. Call the questions asked "snowballs" and the game "snowballing," if you wish.

7. One child chooses, for instance, the combination $3 \times 6 = 18$ in the 6 table, goes to the board, takes chalk, and announces to the class: "I am a child of the 6 family. Can you guess my name?" Perhaps the first pupil answers, "Are you $7 \times 6 = 42$?"

"No, I'm not $7 \times 6 = 42$," responds the child, placing that combination on the board.

"Are you $9 \times 6 = 54$?" asks the next.

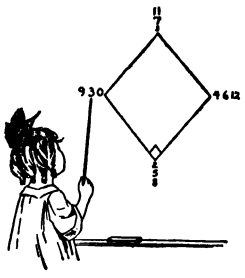
"No, I'm not $9 \times 6 = 54$," answers the child, placing that combination on the board under the other.

When the right answer is given, the child answers, "Yes, I am $3 \times 6 = 18$," places the combination on the board, and gives the chalk to the successful child, who continues the game.

8. Game of Ninepins: Nine pupils stand in a row before the class. The first player asks of one of the ninepins an arithmetic question. The questions may be limited to any part of the work in which a rapid review or test is desired. If one of the ninepins is "hit" (fails to answer correctly), the player may try again, and the one "hit" must take his seat.

9. Snowball battle: Pupils are arranged on two opposing sides, each under a captain. The snowballs are number combinations, such as: $\frac{1}{3}$ of 15; $\frac{1}{2}$ of 20; 4×12. Each player "throws" in turn, the sides alternating. If one is "hit," the captain of the opposing side may choose one of the players from the side on which the error was made.

10. A Baseball Game: Divide the class into A and B sides. Appoint a pitcher and catcher for each side. The A pitcher takes the pointer, and "pitches a ball" by saying, "Multiply by 9," then points to one number at each base from 1st to home. The first pupil on B side stands and answers as pitcher points. Pitcher may give a different question to each player; as, "Add 6," "Subtract from 15," etc. If answers are all correct, a "home run" has been made, and next one on B side recites. If a mistake is made, the A catcher must discover it. Then it is one "out," and next B player "goes to bat." If mistake is not discovered by B catcher, the run counts. When there are three "outs," the side is out, and the other side has an inning. Nine "innings" decide the game. This can be made a very spirited game.



11. Addition: Place column of figures on board, writing slowly at first, and see how many will get the right answer as soon as the column is completed. This can be made to produce quick and accurate work in addition.

12. Keep daily record of work, on blackboard where children can see it, averaging at the end of each week.

13. Estimate distances in feet and yards. Stand 9 feet or 15 feet from a given person or object. Play at taking pictures of persons or objects at 10, 15, 25 feet, etc.

PART FOUR. FOURTH YEAR

READING AND WRITING NUMBERS

467,507 is read *four hundred sixty-seven thousand, five hundred seven.*

10,450 is read *ten thousand, four hundred fifty.*

1. *Read:*

512,239	42,000	639,010
759,283	354,000	25,004
306,429	20,514	106,000
10,450	1,006	70,016
420,216	150,213	236,700

Write in figures:

2. One thousand five hundred seventy-four.
3. Two hundred thirty-four thousand, six hundred ninety-seven.
4. Fifty-nine thousand.
5. Sixty thousand, four hundred thirty.
6. Ninety-nine thousand, four hundred fifty.
7. Sixty-seven thousand, forty-one.
8. Three hundred thousand, seven hundred fifteen.

Give much practice at the blackboard.

I	= 1	XI	= 10 + 1 = 11
II	= 2	XII	= 10 + 2 = 12
III	= 3	XIII	= 10 + 3 = 13
IV	= 4	XIV	= 10 + 4 = 14
V	= 5	XV	= 10 + 5 = 15
VI	= 5 + 1 = 6	XVI	= 10 + 6 = 16
VII	= 5 + 2 = 7	XVII	= 10 + 7 = 17
VIII	= 5 + 3 = 8	XVIII	= 10 + 8 = 18
IX	= 10 − 1 = 9	XIX	= 10 + 9 = 19
X	= 10	XX	= 10 + 10 = 20

Express in Roman numerals:

1. The number of pints in a quart.
2. The number of pints in a gallon.
3. The number of feet in a yard.
4. The number of cents in a dime.
5. The number of inches in a foot.
6. The sum of 6 and 5.
7. The number of cents equal to a nickel.
8. The number that added to 8 will make 17.
9. The number of 8's in 56.
10. The number of inches in $\frac{1}{2}$ of a foot.
11. The number of quarts in a gallon.
12. Twice ten.
13. All the numbers from 10 to 20.

The *value* of any figure depends on its **place.**

Every time a figure is moved one place to the **left** *its value is* **multiplied by ten,** thus:

$$60 = 6 \text{ tens} = 6 \times 10 \qquad = 6 \times 10$$
$$600 = 6 \text{ hundreds} = 6 \times 10 \times 10 \qquad = 6 \times 100$$
$$6000 = 6 \text{ thousands} = 6 \times 10 \times 10 \times 10 = 6 \times 1000$$

Oral.

1. $5 \times 10 = ?$ $5 \times 100 = ?$ $5 \times 1000 = ?$
2. $9 \times 10 = ?$ $9 \times 100 = ?$ $9 \times 1000 = ?$
3. When we multiplied 6, 5, and 9 by 10, we annexed what to them? By 100? By 1000?
4. How may we multiply a number by 10? By 100? By 1000?
5. *Multiply by* 10:

7; 43; 55; 79; 3; 436; 581; 3245; 4823.

6. *Multiply by* 100:

8; 9; 7; 4; 3; 2; 14; 81; 37; 40; 324; 561.

7. *Multiply by* 1000:

1; 2; 5; 8; 12; 61; 19; 83; 10; 425; 306; 420.

8. 70 is how many times 7?
9. 790 is how many times 79?
10. 300 is how many times 3?
11. 4800 is how many times 48?
12. 36,000 is how many times 36?
13. 120 is 10 times what number?
14. 360 is 10 times what number?
15. 9800 is 100 times what number?
16. 354,000 is 1000 times what number?

Written.

1. If one horse is worth $225, what are 30 such horses worth? How shall we find it?

$$\begin{array}{r} \$225 \\ 30 \\ \hline \$6750 \end{array}$$ *Answer*

$30 = 3 \times 10$; therefore, multiplying by 30 is the same as multiplying by 3 and then by 10.

Multiply:

2. 356 by 20.
3. 421 by 50.
4. 796 by 30.
5. 981 by 40.
6. 392 by 60.
7. 846 by 70.
8. 924 by 90.
9. 99 by 80.
10. 89 by 90.
11. 60 by 70.
12. 990 by 50.
13. 760 by 50.

14. At $29 apiece, what will 700 automobile tires cost?

$$\begin{array}{r} \$29 \\ 700 \\ \hline \$20300 \end{array}$$ *Answer*

$29 \times 700 = 29 \times 7 \times 100$.

Multiply:

15. 95 by 700.
16. 87 by 700.
17. 87 by 300.
18. 92 by 400.
19. 39 by 900.
20. 64 by 200.
21. 139 by 200.
22. 460 by 800.
23. 791 by 300.
24. 9 by 900.
25. 77 by 90.
26. 38 by 60.
27. 128 by 50.
28. 36 by 9000.
29. 381 by 7000.

1. Mr. Johnson sells threshing machines at $537 apiece. How much does he receive for 39 machines? What must we do to find it?

537 39 4833 = 537 × 9 1611 = 537 × 30 20943 = 537 × 39	39 = 30 + 9; therefore, we may multiply 537 by 30 and by 9 and add the products. 4833 and 16,110 are called partial products. The 0 may be omitted from units' place in the second partial product.

Multiply:

2. 127 34	3. 206 25	4. 346 15	5. 710 32	6. 532 21	7. 712 33
8. 543 22	9. 763 13	10. 274 16	11. 148 14	12. 714 25	13. 324 34
14. 212 16	15. 742 24	16. 632 70	17. 427 63	18. 654 37	19. 475 38
20. 749 67	21. 746 78	22. 807 89	23. 237 78	24. 415 69	25. 474 68

26. 7 sacks of flour at $1.95 cost how much?

27. 6 pounds of coffee for $1.92 is how much a pound?

28. At $1.75 a day, how much can a man earn in a week?

29. $7.35 paid on a debt of $10.00 leaves how much unpaid?

30. From 120 apples, take 7 dozen apples.

Numbers of Days in the Different Months		
January 31	May 31	September 30
February 28	June 30	October 31
March 31	July 31	November 30
April 30	August 31	December 31

Learn. — Thirty days have September, April, June and November. All the rest have thirty-one, save February which, alone, has twenty-eight; and one day more we add to this, one year in four.

1. How many days in a common year?
2. How many days in a leap year?
3. How many June days have you seen? July days?
4. How many December days have you seen? April days?
5. How many days in 57 common years?
6. How many days in 89 leap years? 44 leap years?
7. How many hours are there in a common year?
8. How many hours are there in a leap year?
9. How many days are there in 9 leap years?
10. How many seconds are there in 24 minutes?
11. How many minutes are there in a day?
12. How many seconds are there in a day?
13. How many school weeks in 475 school days?
14. If there are 8 grades between the kindergarten and the high school, and it takes 200 days to pass each grade, how many days must you attend school to go through all the grades?

1. Find $\frac{3}{4}$ of 252; $\frac{5}{8}$ of 504; $\frac{6}{7}$ of 126.

2. If an acre of land cost \$175, what will 84 acres cost?

3. Mr. Rich earns \$25.76 per week. His son earns $\frac{6}{7}$ as much. How much does the son earn?

4. Multiply twenty-nine thousand four hundred sixty-three by fifty-seven. Write the product in words.

5. A man had 196 books. He gave his son $\frac{5}{7}$ of them. How many books did the son receive?

6. The Revolutionary War began in 1775. How many years from that time to the beginning of the Spanish war in 1898?

7. Find the product of 842 and 76.

8. Sarah had \$.89 after buying a 50-cent book and a 25-cent comb. How much had she at first?

9. $448 \div 7 = ?$ 10. $390 \div 5 = ?$ 11. $863 \times 9 = ?$

12. \$152 will buy how many washing machines at \$8 each?

13. A boy had saved \$2 and then spent \$.60 for presents. How much had he left?

14. Leo had \$3.68 and his father gave him enough more to buy a \$5.00 scout suit. How much did his father give him?

15. A man owed \$265 and paid \$199. How much did he still owe?

16. Our electric light bill for February was \$1.65. For May it was $\frac{2}{3}$ as large. What was the bill for May?

1. $5 + 8 + 7 + 6 + 9 = ?$
2. Write 19 in Roman numerals.
3. Find the cost of 8 pounds of sugar at 5 cents a pound.
4. Add 62 and 31.
5. Subtract 49 from 83.
6. Find $\frac{2}{7}$ of 28.
7. How many quarts in 3 pk. of corn?
8. 120 minutes are how many hours?
9. How many inches in 9 feet?
10. $7 \times 9 + 8 - 7 = ?$

ORAL PROBLEMS

Answer to yourself these questions about each problem: *a. What is told? b. What is asked? c. What must I find first?*

1. If 7 oranges cost 21 cents, 1 orange costs —— cents. 5 oranges cost —— cents. Make the question.

2. *a.* Bessie picked 5 qt. of berries on Monday, 8 on Tuesday, and 7 on Wednesday; in the three days she picked —— quarts.

b. If she sold 10 quarts and gave the rest to her mother, she gave her mother —— quarts.

3. If a dozen oranges cost 48 cents, 1 orange costs —— cents. 11 oranges cost —— cents. Question.

4. If eggs are $.36 a dozen, 1 egg costs —— cents. 7 eggs cost —— cents. Question.

5. If 10 eggs cost 30 cents, 1 egg costs —— cents. A dozen eggs cost —— cents. Question.

1. A man earned \$8 one week, \$9 the next, \$10 the next. How much money did he earn in the three weeks?

2. John walked 4 miles and Roy walked five times as far. How far did Roy walk?

3. A man earns \$15 a week and saves $\frac{1}{5}$ of it. How much does he save in one week?

4. If Harry's brother saves \$3 every week, in how many weeks will he save \$27?

5. If Mr. Welch earns \$27 and puts \$20 in the bank, how much does he keep?

6. Ned has three rabbits and Ted four times as many. How many has Ted?

NOTE. — Problems 7–12 are for the strong pupils.

7. A lady bought 3 dozen buttons at 8 cents a dozen, and a yard of ribbon at 10 cents. What did she pay for both?

8. At 6¢ a quart, what will 3 gal. of oil cost?

9. How many 5-cent carfares can be paid with a quarter, a dime, and a half dime?

10. Elsie bought a tablet for 8 cents, a stamp for 2 cents, and some pencils for 9 cents. She gave the clerk a quarter. How much change should she receive?

11. A man earned \$42 and used $\frac{6}{7}$ of it. How much did he use? How much had he left?

12. Four oranges cost 12 cents. At the same price, what must be paid for 8 oranges?

1. Our milkman had in his wagon 12 gallons of milk in quart bottles. How many bottles of milk had he?

2. If 5 pencils cost 15 cents, what will 1 pencil cost? What will 3 pencils cost? 10 pencils? 11 pencils?

3. $\frac{3}{4}$ of a yard of ribbon is how many inches long?

4. A four-foot rule could be cut into how many sticks, each six inches long?

5. 3 min. = —— sec.; 2 hr. = —— min.

6. 4 wk. = —— da.; 5 yr. = —— mo.

7. $\frac{1}{2}$ hr. = —— min.; 7 gal. and 3 qt. = —— qt.; 9 qt. and 1 pt. = —— pt.

8. 4 doz. + 3 = ——; 8 doz. + 2 = ——
6 doz. + 11 = ——; 11 doz. + 6 = ——

9. How many dozen, and how many over, in 17? 27? 39? 46? 54?

10. *Read each number in the inner square before every sign in the outer squares, and find the result.*

+5	÷2	−7	÷12
÷3	36		×10
÷6	72 108		−29
÷9	÷4	−11	+9

11. $4 \times 8 + ? = 35$;
$7 \times 9 + ? = 69$.

12. $7 \times 7 + ? = 58$;
$8 \times 6 + ? = 54$.

13. What is the time when the hour hand is at VIII? Where is the minute hand then?

15. What is the time when the hour hand is between V and VI and the minute hand is at III? When the minute hand reaches IX?

16. What is the cost of 2 bu. of potatoes at 25¢ a peck?

1. Find 7 times 389 by addition and by multiplication.

2. Find by subtraction how many 16's in 176; in 96; in 144; in 80; in 160; in 112; in 128.

3. *Write answers only. Add up and down. How long will it take?*

a.	*b.*	*c.*	*d.*	*e.*
463	453	$478.45	$165.35	$ 4.10
274	224	85.46	48.64	467.20
632	35	300.18	48.03	254.18
49	368	63.24	6.00	325.16
548	74	.65	17.40	49.21
231	989	49.85	5.84	8.00
598	6785	237.46	97.68	77.56

4. *a.* 3642×24; *b.* 4832×34; *c.* 2356×43; *d.* 805×96.

5. Find the quotient and remainder: *a.* $347 \div 5$; *b.* $643 \div 6$; *c.* $487 \div 8$; *d.* $3067 \div 9$; *e.* $4234 \div 7$.

NOTE. — Problems 6 and 7 are for the strong pupils.

6. At our festival we used 125 gallons of ice cream. *a.* How many quarts were used? *b.* If each quart was served to 6 persons, how many persons had cream?

7. *a.* A market man bought 1057 pounds of beef, 538 pounds of mutton, and 457 pounds of veal. How many pounds of meat did he purchase? *b.* After he had sold 986 pounds of meat, how many pounds remained?

8. Our postman delivered 583 letters on Monday, 376 on Tuesday, 312 on Wednesday, 249 on Thursday, 413 on Friday, and 307 on Saturday. What was the total for the week?

PROBLEMS OF WORK

Written.

Papers sold by seven boys during one week:

	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.
Henry . . .	36	28	24	14	26	32
Carl	24	35	25	16	18	26
Jerry	18	23	26	24	28	29
Frank . . .	29	18	21	32	27	35
Charles . . .	15	26	18	27	34	36
Roy	34	31	30	28	26	27
Edward . . .	12	23	20	19	27	28

1. Find the number of papers sold on Monday; Tuesday; Wednesday; Thursday; Friday; Saturday.

2. Find the number sold during the week by Henry; Carl; Jerry; Frank; Charles; Roy; Edward.

3. Find: *a.* The total number sold on all the days. *b.* The total number sold by all the boys. *c.* How do these two numbers compare?

4. John earned $18 during the vacation and spent $12.75. How much did he save?

5. Fern can make a yard of tatting in two hours. *a.* How many minutes does it take her? *b.* In how many minutes can she make $\frac{3}{8}$ of a yard?

6. Arlene ironed 19 handkerchiefs, 13 towels, 6 pillowcases, 9 pieces of underclothing and 25 other pieces. How many pieces did she iron in all?

7. How much expense did this work save Arlene's mother if such ironing is worth 15¢ a dozen pieces?

1. Mr. Coman's automobile uses a gallon of gasoline in running 23 miles. How many miles can he run with 19 gallons of gasoline?

2. Mr. Whitmore brought 75 boxes of peaches to market, each box containing 76 peaches.

a. How many peaches were there in all?

b. How much were they worth, at 65 cents a box?

3. Our grocer bought a carload of potatoes. It contained 595 sacks. What did they cost at 98 cents a sack?

4. Ellen's brother earns $85 a month. How much does he earn in 27 months?

5. There are 558 teachers in the schools of our city. If there are 29 pupils for each teacher, how many pupils are there in all our schools?

6. A clothing factory made 2429 overcoats worth $19 apiece. How much were they all worth?

Multiply:

7. Seven thousand sixty-nine by eighty-five.

8. Nine hundred eighty-four by three hundred twenty-six.

9. Eight thousand ten by ninety-nine.

10. Seven hundred twenty-nine by eight hundred fifty-four.

11. Three thousand seventy by five hundred eighty.

12. Nine thousand seven hundred eighty-four by six hundred sixty.

Add up, then down. Write only the sums. 5 minutes?

1.	2.	3.	4.	5.
$548.42	4835	4782	63854	$381.15
57.54	724	95	9763	42.81
6.00	89	398	427	68.73
.84	38984	27579	5106	59.42
346.99	35	49895	78243	486.53
24.63	672	6879	4675	79.49
51.06	4897	4623	1016	83.26

Find the differences and test results:

6.	7.	8.	9.	10.
7821	$200.14	$800.00	7421	8402
6459	89.27	256.13	1695	1673

Find:

11. $\frac{1}{7}$ of 2982. 12. $\frac{1}{8}$ of 2832. 13. $\frac{1}{5}$ of 5715. 14. $\frac{1}{4}$ of 2732.
15. $\frac{1}{7}$ of 651. 16. $\frac{5}{7}$ of 651. 17. $\frac{1}{8}$ of 5640. 18. $\frac{7}{8}$ of 5640.
19. 43×500. 20. 691×70. 21. 39×3000. 22. 865×80.
23. 196×39. 24. $\frac{2}{3}$ of 681. 25. $\frac{3}{4}$ of 796. 26. $\frac{5}{8}$ of 888.

Multiply:

27. 763 by 42. 28. 529 by 43. 29. 862 by 31.

30. How many days in the first six months of the year?

31. Counting 30 days for a month, how many months in 180 days?

32. How many quarts in 798 bushels?

33. If our living expenses for a week are $7.56, how much are they for one day?

34. How much are our expenses for 9 days?

35. How much are our expenses for 4 weeks?

1. 325×764.		2. 869×307.	
325		869	
764	$= 700 + 60 + 4$	307	
1300	$= 325 \times 4$	6083	$= 869 \times 7$
1950	$= 325 \times 60$	2607	$= 869 \times 300$
2275	$= 325 \times 700$	266783	
248300	$= 325 \times 764$		

Observe that the first figure of each partial product is placed under the figure used for a multiplier.

3. A tract of land is laid out in 248 lots, each one for sale at $375. If the owner sells all of them at that price, how much will he receive for them?

4. Multiply 239 by 158. Multiply 158 by 239. How do the products compare?

5. Find how 412 times 653 compares with 653 times 412.

6. Henry's kite string is 648 ft. long. How many feet of twine would it take to make 207 such kite strings?

How many partial products will you have?
Where will you write the first figure of the second partial product?

Find the products in two ways:

7. 385×209.
8. 842×351.
9. 496×258.
10. 324×807.
11. 209×506.
12. 983×786.
13. 428×732.
14. 356×271.
15. 854×305.
16. 907×635.
17. 294×687.
18. 839×594.

19. If a baggage car goes 248 miles every day, how many miles will it go in a year?

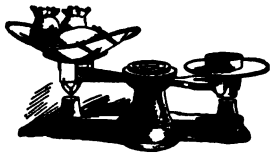
1. 345×21.
2. 621×43.
3. 890×36.
4. 729×48.
5. 831×25.
6. 724×18.
7. 803×19.
8. 614×81.
9. 908×72.
10. 807×39.
11. 315×89.
12. 375×86.
13. 180×93.
14. 856×88.
15. 918×79.
16. 352×63.
17. 698×44.
18. 309×57.
19. 830×63.
20. 719×75.
21. 398×78.
22. 634×87.
23. 839×93.
24. 418×61.
25. 983×67.
26. 399×87.
27. 631×212.
28. 813×321.
29. 419×225.
30. 834×761.
31. 818×919.
32. 635×421.
33. 816×632.
34. 841×729.
35. 108×317.
36. 428×911.
37. 361×842.
38. 824×121.
39. 412×818.
40. 604×213.
41. 708×315.
42. 365×218.
43. 498×315.
44. 860×715.
45. 724×318.
46. 593×818.
47. 594×761.
48. 998×342.
49. 839×724.
50. 987×468.
51. 730×590.
52. 813×719.
53. 254×352.
54. 425×63.
55. 793×70.
56. 864×50.
57. 395×600.
58. 418×900.
59. 352×763.
60. 295×190.
61. 376×584.
62. 231×528.
63. 379×800.
64. 633×900.
65. 387×408.
66. 291×190.
67. 838×242.
68. 791×635.
69. 829×935.
70. 910×900.
71. 763×581.
72. 298×761.
73. 435×600.
74. 29×900.
75. 325×716.
76. 976×308.
77. 952×449.
78. 613×808.
79. 475×324.
80. 639×913.
81. 785×407.

NOTE. — Have scales before the class.

1. For what are the scales used?

2. Find the pound weight.

3. Let each pupil take the pound weight in his hand.



4. Name articles that weigh about a pound. Weigh them.

5. Put sand in a bag until you think you have a pound. Weigh and correct it.

6. Use the bag of sand for a pound weight. Find the ounce weight. Weigh out several ounces of sand in bags. Find how many ounce bags are needed to balance the pound bag.

7. There are —— ounces (oz.) in 1 pound (lb.).

8. Name articles that are sold by the pound; by the ounce.

9. How many ounces are there in 2 lb.? 3 lb.? 5 lb.?

10. How many ounces in $\frac{1}{2}$ lb.? $\frac{1}{4}$ lb.? $\frac{1}{8}$ lb.?

11. How many ounces in $1\frac{1}{2}$ lb.? $2\frac{1}{2}$ lb.? $1\frac{1}{4}$ lb.?

12. Mr. Jolly, the candy maker, gave away 25 lb. of candy, putting 1 oz. into each bag. How many bags of candy did he give away?

13. *a.* How many days will 7 lb. of sugar last if you eat an ounce every day? *b.* How many weeks?

14. If the average weight of the plums on Jack's plum tree is 1 oz., how many plums will it take to weigh 395 lb.? 476 lb.? $\frac{1}{2}$ lb.?

1. How much is $\frac{1}{4}$ of a peck? $\frac{1}{10}$ of \$150?

2. If I give a dollar in payment for 9 qt. of peaches at 10¢ a quart, what change should I receive?

3. *Find the sums and differences:*

68	54	78	49	51	63	58	41	53
29	26	16	27	33	37	29	24	39

4. How many feet in 108 inches? How many yards?

5. How many times can a two-quart measure be filled from a bushel of walnuts?

6. I have 12 rows of strawberry plants with 12 plants in each row. How many plants have I? (Picture.)

7. Find the cost of 8 tons of rye straw at \$20 a ton.

Written.

1. At Mann's store 85 crates of Georgia peaches, each crate containing 6 baskets, were sold in 1 day. How many baskets were sold?

2. *a.* If a boy can ride his bicycle 8 miles an hour, how many hours will it take him to ride 288 miles?

b. If he rides 6 hours a day, how many days will it take?

3. From the sum of 4623 and 5498 subtract their difference.

4. If 3 horses cost \$678, what will 12 horses cost at the same rate? (12 is how many times 3?)

5. 43×280 6. 231×600 7. 435×309 8. $9\overline{)649}$ 9. $6\overline{)435}$

10. Twenty dollars less \$9.40 is how much?

1. *Moving a figure to the* **left** *one place multiplies its value by* **10.** Moving a figure one place to the right does what to its value?

2. $9 \times 10 = 90$; $90 \div 10 = ?$

3. $23 \times 10 = 230$; $230 \div 10 = ?$

4. *To multiply a number by* 10 *we annex a cipher.* How may we divide a number by 10?

5. *Divide by* 10:

80; 60; 130; 740; 800; 4360; 560; 1300.

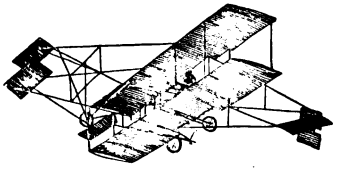
6. *To multiply a number by* 100 *we annex two ciphers.* How may we divide a number by 100 if it has ciphers at the end?

7. *Divide by* 100:

600; 900; 1200; 2300; 6000; 48,000; 64,500; 360,000.

Written.

8. Flying at the rate of 70 miles an hour, in how many hours will an aëroplane fly 1260 miles?



18 hours *Answer.*

$70\overline{)1260}$

$70 = 7 \times 10$. To divide by 70, we divide by 10 and then by 7. How do we divide by 10?

9. $30\overline{)34,920}$ **10.** $40\overline{)2480}$ **11.** $50\overline{)4750}$ **12.** $60\overline{)720}$

Divide by 90:

13. 1620. **14.** 4770. **15.** 71,100. **16.** 108,000. **17.** 17,280.

Divide:

18. 680 by 20. **19.** 1560 by 40. **20.** 3240 by 60.

1. Complete this number story by filling in the runs for the 9th inning.

At the ball game last week the visiting team made 3 runs in the first inning, 1 in the second, 4 in the fifth, 2 in the sixth, 3 in the seventh, and 3 in the ninth. Our team made 11 runs in the first eight innings and —— in the ninth, thus winning the game by 2 runs.

2. Louis buys papers at the rate of three papers for four cents. How much must he pay for 15 papers? How much does he make on them if he sells them at two cents apiece?

3. At the rates given in problem 2, how much would Louis make on 3 Ledgers and 6 Journals?

4. Margaret had 75 cents. How many handkerchiefs could she buy at 21¢ each and how many cents would she have left?

3 handkerchiefs 21)75¢ 63 12¢ Left	Three handkerchiefs would cost 63¢. 75¢ − 63¢ = 12¢ left.

Written.

Find quotients and remainders:

5. 21)79	6. 21)98	7. 31)89	8. 41)235
9. 61)342	10. 51)364	11. 91)823	12. 61)378
13. 22)139	14. 32)172	15. 63)295	16. 82)765
17. 19)95	18. 18)130	19. 19)180	20. 22)193

1. On Flag Day, 756 flags were given out in the 21 rooms of Lincoln school. That was how many flags for each room?

36 21)756 63 126 126	PROCESS 21 is not contained in 7 hundred any hundred times. It is contained in 75 tens, 3 tens times, and 12 tens over. Twelve tens and 6 units are 126 units. 21 is contained in 126 six times.

Divide by 21:

2. 504.	3. 735.	4. 882.	5. 966.	6. 924.
7. 693.	8. 987.	9. 525.	10. 399.	11. 714.
12. 609.	13. 672.	14. 378.	15. 861.	16. 777.
17. 945.	18. 903.	19. 819.	20. 798.	21. 756.

Divide by 31:

22. 868.	23. 992.	24. 682.	25. 806.	26. 713.
27. 589.	28. 527.	29. 899.	30. 837.	31. 775.
32. 744.	33. 496.	34. 372.	35. 465.	36. 434.

Divide by 41:

37. 984.	38. 861.	39. 943.	40. 902.	41. 779.
42. 615.	43. 697.	44. 574.	45. 738.	46. 533.

Give many examples like those above, using divisors 51, 61, etc. The three great difficulties are: 1. Partial dividend containing one more figure than the divisor; 2. 0 in the quotient; 3. Apparent quotient figure not the real quotient figure. Introduce none of these until the *form* and *process* are thoroughly mastered. Then teach them, one at a time.

1. Mr. Cleveland bought a fruit ranch of 61 acres for $14,945. How much per acre did it cost?

$245 *Quo.* 61)$14945 122 274 244 305 305	To get the quotient figure, say, "6 in 14," "6 in 27," "6 in 30." NOTE. — Let these four steps be placed on the blackboard to be referred to by pupils until familiar to them: 1. Quotient figure, 2. Multiply, 3. Subtract, 4. Bring down.

Divide by 61:

2. 14,396. **3.** 8357. **4.** 25,681. **5.** 9289.

6. 51,362. **7.** 50,325. **8.** 41,053. **9.** 56,547.

Divide by 71:

10. 66,314. **11.** 20,438. **12.** 29,962. **13.** 45,369.

Divide by 81:

14. 18,954. **15.** 28,836. **16.** 37,827. **17.** 46,818.

Divide by 91:

18. 39,312. **19.** 49,413. **20.** 59,514. **21.** 79,716.

Find the quotient:

22. 69,615 ÷ 91. **23.** 5566 ÷ 22. **24.** 11,704 ÷ 22.

25. 14,190 ÷ 22. **26.** 8382 ÷ 22. **27.** 13,568 ÷ 32.

28. 23,424 ÷ 32. **29.** 23,424 ÷ 32. **30.** 26,976 ÷ 32.

31. 30,528 ÷ 32. **32.** 7520 ÷ 32. **33.** 23,008 ÷ 32.

34. 22,722 ÷ 42. **35.** 27,384 ÷ 42. **36.** 32,046 ÷ 42.

37. 12,168 ÷ 52. **38.** 17,940 ÷ 52.

1. How many pints in 4 gal.?

2. A quart is what part of a gallon? 2 qt.? 3 qt.?

3. $\frac{5}{8}$ of a yard is how many inches?

4. Charles was punctual at school every morning for 20 weeks. How many times was he punctual?

5. $\frac{1}{8}$ of 40 = ? $\frac{1}{5}$ of 40 = ? What part of 40 is 5?

6. How many 6's in 12? 6 is what part of 12? 6 months is what part of a year?

7. Sarah's brother earns \$16 a week and saves $\frac{1}{4}$ of it. In how many weeks can he save \$20?

8. Candy at 2 ¢ an ounce is how much a pound? What is a quarter of a pound worth? A half pound?

QUICK MENTAL TEST

1. How many ounces in a half pound?

2. How many ounces in $\frac{3}{4}$ of a pound?

3. How many 12's in 52 and how many over?

4. 12 gal. and 3 qt. are how many quarts?

5. At 5 ¢ a foot, what will a yard of picture molding cost?

6. A half hour is how many minutes?

7. If you buy a book for \$.15, how much change should you receive from a quarter?

8. Four dimes and a half dime are how many cents?

9. How many inches in a yard?

10. Two quarts of berries at 10 ¢ a quart and a loaf of bread at 5 ¢ cost how much?

1. In 48 pecks there are how many quarts?

2. The Pilgrims came to America in 1620. How long ago did they come?

3. I bought a lot for $598. For what must I sell it to gain $59?

4. Our milkman sells 36 gallons of milk every day. How many pints does he sell?

5. Robert bought some clothes for $5.45. He gave the clerk a $5 bill and a silver dollar. How much change should he receive?

6. 5 tons of coal cost $31.25. Find the cost of 1 ton.

7.	8.	9.	10.	11.
423	524	4031	4706	5072
−297	−349	−1234	−927	−3095

12. *Write in words:* 31,605; 270,040; 341,005; 104,500.

13. *Write in figures:* three hundred thousand twenty; eighteen thousand fourteen; six thousand three hundred thirty; one hundred fifty-seven thousand nine.

Find:

14. $\frac{2}{3}$ of 1032. 15. $\frac{3}{4}$ of 992. 16. $\frac{4}{5}$ of 560. 17. $\frac{3}{5}$ of 1675.

18. From seventy dollars and twenty-nine cents take fifty-two dollars and sixty-nine cents.

19. At 30 cents a peck, what will 12 pk. of apples cost?

20. A lady had $135. She paid $45 for a sewing machine and $22 for cloth. How much has she left?

21. There are 7 dozen lemons in one box and 83 lemons in another. How many lemons in both boxes?

1. Divide 1134 by 21. To find the first figure in the quotient, ask yourself, " How many 2's in 11? "

2. *Divide by* 21:

a. 8883; *b*. 6515; *c*. 19,677; *d*. 9639.

3. Divide 2573 by 31. To get the first quotient figure say, " How many 3's in 25? "

4. *Divide by* 31:

a. 2635; *b*. 2883; *c*. 3875; *d*. 14,353.

In examples 5–19, *find the quotients and test your work by multiplication:*

5. $1599 \div 41$.	**10.** $814 \div 22$.	**15.** $2108 \div 62$.
6. $6068 \div 41$.	**11.** $2912 \div 32$.	**16.** $6912 \div 72$.
7. $2346 \div 51$.	**12.** $768 \div 32$.	**17.** $4756 \div 82$.
8. $2275 \div 91$.	**13.** $3486 \div 42$.	**18.** $1288 \div 92$.
9. $1386 \div 22$.	**14.** $4992 \div 52$.	**19.** $2511 \div 93$.

Find the products and test your work by division:

20. 46×31.	**22.** 124×32.	**24.** 93×52.
21. 53×21.	**23.** 63×61.	**25.** 242×71.

26. One factor of 3844 is 62. Find the other factor.

27. $43 \times ? = 5203$. **28.** $11{,}070 \div ? = 82$. **29.** $? \times 61 = 1159$.

30. The multiplier is 42. The product is 3444. What can you find?

31. The divisor is 78, the quotient 467. What can you find?

32. Lucien sold 806 papers in the month of May. That was how many per day?

Every problem tells us something and asks us to find something. We use what is told, to find what is asked.

The following exercises tell you something. Ask the question in each one and answer it.

1. Berries are 10 cents a quart. John bought 7 qt.
2. Mary had 21 cents. Oranges cost 3 cents apiece.
3. Seven pounds of maple sugar cost 84 cents.
4. Chester is 5 ft. tall. There are —— inches in a foot.
5. There are —— seconds in a minute. It takes Leah 5 seconds to answer a question.
6. Chocolate creams cost 3 ¢ an ounce. There are —— ounces in a pound.
7. Frances earned 11 cents on Friday, 9 cents on Tuesday, and 10 cents on Wednesday.
8. Richard earned 41 cents and paid 5 ¢ for carfare.
9. Nina took a music lesson twice a month for a whole year. There are —— months in a year.
10. Robert is 14 years old. His sister Dorothy is ten.
11. Mary is 19 years old. Frederick is 7 years younger.
12. Lemons are 24 cents a dozen. Ethel bought 6 lemons.
13. There are 8 hours in a working day. Philip worked 72 hours.
14. Make a problem for \$.05 + \$.06 + \$.07.
15. $\frac{1}{4}$ of 16 = ? Make a problem.
16. $\frac{3}{4}$ of 36 = ? Make a problem.
17. $10 \times 2 = ?$ Make a problem.

1. John paid \$.36 for 9 packages of flower seeds. Question.

2. Wilbert has a strip of oak wood 5 ft. long. He is making 6-inch rules. Question.

3. Make a problem for 4 times 12 in.

4. A bushel of potatoes is worth 80 cents. A peck is —— of a bushel. Question.

5. Alice made a dozen pop-corn balls. Lena made three times as many. How many did both make?

6.

3	6	2	12	11	4	10	8	5	9	7

Multiply the numbers above by 7, 8, and 9.

7. At \$.06 a pound, find the cost of 3 lb. of starch; 8 lb.; 10 lb.; 9 lb.; 12 lb.; 50 lb.; 11 lb.; 20 lb.

8. 33 bananas were sold from a bunch containing 7 dozen. How many were left? (For strong pupils.)

Written.

1. January, March, May, July, August, October, and December each have 31 days. How many days in all these months? Find it in two ways.

2. A man in Vermont made 388 qt. of maple sirup. He put it into gallon cans. Question. Answer.

3. Make a problem for \$84.50 − \$13.27.

4. Make a problem for 38 × 7 da.

5. Write in words: 304,091; 20,040; 100,001; \$50.03.

6. I saw an ocean steamship 499 feet long. There are —— inches in a foot. Question. Answer.

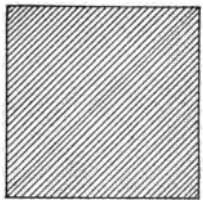


FIG. 1.

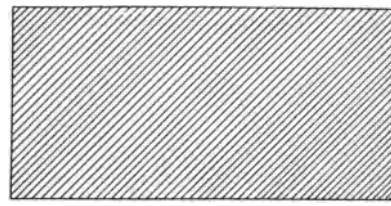


FIG. 2.

1. What is the shape of Figure 1? How long is it? How wide?

What is it called? Describe a **square inch** (*sq. in.*).

2. Without a rule, draw a square inch. Measure and correct it.

3. The corners of a square are *right angles*. This is a right angle ⌊. How many right angles has a square?

4. What kind of angles has Figure 2?

5. How many right angles has Figure 1? Figure 2?

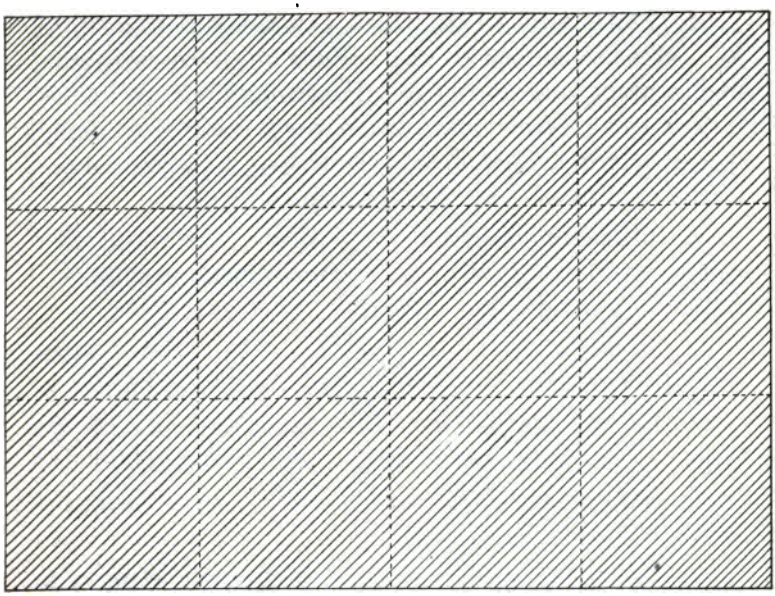
6. Figure 1 and Figure 2 are **rectangles**. Describe a rectangle.

7. A rectangle may be either square or oblong. Make an oblong rectangle 3 in. long and 1 in. wide. Draw lines cutting it into square inches. How many square inches are there?

8. Find out how many square inches in an oblong 1 inch wide and 3 inches long; 4, 5, 6, 10, 11, 13 inches long.

9. Draw a rectangle three inches long and 2 inches wide. Mark it off into square inches and count them.

10. Draw a square 3 in. long. Mark it off into square inches and count them.



1. What is the name of this figure? How wide is it? How long? Its size is **3 in. by 4 in.**

2. The dotted lines drawn from left to right divide the rectangle into oblongs how long and how wide? How many of them?

3. Each oblong 4 in. long and 1 in. wide contains how many square inches? How many square inches in all of them? Three times 4 sq. in. are how many square inches?

4. The dotted lines from top to bottom divide the rectangle into how many oblongs? Each of these oblongs is how long? How wide? It contains how many square inches? $4 \times 3 = ?$

1. Draw a rectangle which you think is 6 in. by 5 in. Measure and correct it. Mark out a row of square inches along one side of it. How many square inches in this row? How many such rows could you make from the whole rectangle? How many square inches in the rectangle? 5 times 6 sq. in. = ?

2. Make a rectangle 7 in. by 4 in. Mark it off into square inches. How many square inches in the rectangle? How do you find it?

3. Make a rectangle 8 in. by 6 in. How many square inches does it contain? How do you find it?

4. On the blackboard, draw a rectangle 18 in. by 7 in. How many square inches does it contain?

5. How many square inches in an oblong 24 in. by 12 in.? Make the drawing.

6. Find the number of square inches in the top of a table which is 22 in. by 38 in.

Find the number of square inches in each of the following rectangles:

7. 39 in. by 42 in.
8. 68 in. by 29 in.
9. 47 in. by 33 in.
10. 59 in. by 28 in.
11. 39 in. by 2 feet.
12. 62 in. by 37 in.
13. 41 in. by 48 in.
14. 36 in. by 19 in.
15. 38 in. by 40 in.
16. 3 ft. by 20 in.

17. *a.* A blackboard 2 ft. 6 in. wide is how many inches wide? *b.* A blackboard 4 ft. long is how many inches long? *c.* How many square inches in a blackboard 4 ft. by 2 ft. 6 in.?

Division may be indicated in three ways:

1. *By the* **division sign**, $22{,}196 \div 62$.
2. *By* **lines**, $62\overline{)22196}$
3. By writing the **dividend above**, and the **divisor below** a line, $\frac{22196}{62}$.

Find the quotients:

1. $22{,}196 \div 62$.	**2.** $58{,}608 \div 72$.	**3.** $8{,}208 \div 62$.
4. $30{,}750 \div 82$.	**5.** $59{,}708 \div 92$.	**6.** $25{,}560 \div 72$.
7. $60{,}912 \div 72$.	**8.** $48{,}024 \div 72$.	**9.** $59{,}286 \div 82$.
10. $29{,}356 \div 82$.	**11.** $39{,}442 \div 82$.	**12.** $65{,}518 \div 82$.
13. $16{,}652 \div 92$.	**14.** $9{,}016 \div 92$.	**15.** $39{,}284 \div 92$.
16. $74{,}976 \div 92$.	**17.** $21{,}114 \div 23$.	**18.** $10{,}373 \div 23$.
19. $16{,}606 \div 23$.	**20.** $3{,}151 \div 23$.	**21.** $21{,}516 \div 33$.
22. $27{,}291 \div 33$.	**23.** $17{,}061 \div 33$.	**24.** $8{,}085 \div 33$.
25. $35{,}088 \div 43$.	**26.** $31{,}003 \div 43$.	**27.** $22{,}532 \div 43$.
28. $30{,}788 \div 43$.	**29.** $6{,}625 \div 53$.	**30.** $11{,}978 \div 53$.
31. $38{,}319 \div 53$.	**32.** $52{,}947 \div 54$.	**33.** $22{,}239 \div 63$.
34. $27{,}027 \div 63$.	**35.** $33{,}012 \div 63$.	**36.** $42{,}336 \div 63$.
37. $29{,}925 \div 63$.	**38.** $38{,}398 \div 73$.	**39.** $52{,}414 \div 73$.
40. $83\overline{)20667}$	**41.** $83\overline{)76443}$	**42.** $83\overline{)29548}$
43. $83\overline{)16434}$	**44.** $93\overline{)67425}$	**45.** $93\overline{)61101}$

NOTE. — The following are merely problems in long division. They involve no operations with fractions. Every example in division may be expressed in this form. A fraction is always an expression of division.

46. $\frac{8316}{22}$	**47.** $\frac{23085}{81}$	**48.** $\frac{61632}{72}$
49. $\frac{25792}{31}$	**50.** $\frac{26624}{832}$	**51.** $\frac{15738}{43}$

1. Mr. Wilson bought a farm for $9044. How much must he save each year to pay for it in 19 years?

$$
\begin{array}{rl}
 & \$476 \\
19)\overline{\$9044} & \\
(20)\ \ 76 & \\
\underline{\ \ 144} & \\
\ \ 133 & \\
\underline{\ \ 114} & \\
\ \ 114 & \\
\end{array}
$$

19 is almost 20. Think how many 2's in 9. To get the next quotient figure, think how many 2's in 14. To get the next quotient figure, think how many 2's in 11. 5 is a little too small, because it gives a remainder 19, the same as the divisor. What is the correct figure?

2. Divide 12,499 by 29. (29 is almost 30. Let 3 be your *guide figure* and think how many 3's in 12, etc.)

3. Divide 2808 by 39. (39 is almost 40. What will you take for a guide figure?)

4. 2,808 ÷ 39.
5. 24,708 ÷ 29.
6. 11,837 ÷ 19.
7. 4,508 ÷ 49.
8. 36,639 ÷ 59.
9. 16,008 ÷ 69.
10. 64,148 ÷ 79.
11. 4,539 ÷ 89.
12. 2,772 ÷ 99.
13. 792 ÷ 18.
14. 10,584 ÷ 28.
15. 10,353 ÷ 29.
16. 2,242 ÷ 38.
17. 8,064 ÷ 48.
18. 14,732 ÷ 58.
19. 4,420 ÷ 68.
20. 6,318 ÷ 78.
21. 45,056 ÷ 88.
22. 6,174 ÷ 98.
23. 3,315 ÷ 39.

24. A train of 9 sleeping cars is 702 ft. long. How long is each car?

25. How many coal cars 31 ft. long would make a train 1395 ft. long?

26. When you have a product and one of its factors, how do you find the other factor? What is the length of a rectangle 12 in. wide that contains 840 sq. in.?

I. *See how quickly you can get correct sums:* (5 *minutes?*)

1.	2.	3.	4.
$173.25	$ 836.42	$7000.42	497
92.47	1521.50	83.92	6839
9.38	936.08	6214.83	709
407.25	42.53	807.15	598
92.16	1006.27	78.26	763
57.84	83.44	9287.42	6908
9.26	64.29	383.52	89718

II. *Find the missing numbers. Test your work:*

1.	2.	3.	4.
645,071	48,356	58,605	?
280,693	?	?	59
Sum	97,403 *Sum*	29,567 *Diff.*	708 *Prod.*

III. *Divide by* 4:

1. 362,416. 2. 122,028. 3. 816,208. 4. 162,832.

IV. *Multiply:*

1. 243 by 260. 2. 506 by 206. 3. 3424 by 60.
4. 928 by 453.

V. *Divide:*

1. 253,540 by 5. 2. 364,218 by 6. 3. 3642 by 6.
4. 4530 by 5.

VI. *Find:*

1. The area of a rectangle 98 in. by 70 in.
2. The length of a rectangle 30 in. wide that contains 1710 sq. in.
3. The other factor of 6447, when 21 is one factor.
4. The product of 875 and 900.

1. Mr. McHenry paid $37,500 for 300 acres of land. How much per acre did he pay?

125 *Answer.* 3$\not{0}\not{0}$)$37\not{5}\not{0}\not{0}$	300 = 3 × 100. We divide by 100, then by 3. How do we divide by 100?

2.	1,500 ÷ 300.	15.	14,400 ÷ 600.	28.	4,200 ÷ 70.
3.	1,500 ÷ 500.	16.	37,100 ÷ 700.	29.	342 × 60.
4.	4,500 ÷ 300.	17.	60,900 ÷ 700.	30.	34 × 90.
5.	4,500 ÷ 500.	18.	77,600 ÷ 800.	31.	81 × 700.
6.	7,500 ÷ 500.	19.	17,400 ÷ 600.	32.	495 × 310.
7.	11,200 ÷ 700.	20.	4,050 ÷ 90.	33.	490 ÷ 70.
8.	72,000 ÷ 600.	21.	6,000 ÷ 80.	34.	34,600 ÷ 40.
9.	84,000 ÷ 700.	22.	75,600 ÷ 90.	35.	27,900 ÷ 90.
10.	37,800 ÷ 900.	23.	3,010 ÷ 70.	36.	6,420 ÷ 60.
11.	44,100 ÷ 900.	24.	31,200 ÷ 80.	37.	4,800 ÷ 80.
12.	87,600 ÷ 300.	25.	6,300 ÷ 700.	38.	62,500 ÷ 500.
13.	1,800 ÷ 900.	26.	3,240 ÷ 60.	39.	91,000 ÷ 700.
14.	23,400 ÷ 300.	27.	75,600 ÷ 900.	40.	34,000 ÷ 2000.

41. Laura's father works 300 days every year. How many days does he work in 16 years?

42. At $300 apiece, how many army horses can be bought for $20,700?

43. Our city blocks are 400 feet long. When we walk 13 blocks, how many feet do we walk?

Oral.

1. Wilfred picked 2 lb. of cherries. How many ounces of cherries did he pick?

2. 3 ft. and 2 in. are —— in.

3. Albert bought a piece of rope 36 ft. long and used $\frac{2}{3}$ of it for a swing. How many feet of the rope did he use?

4. Harold picked a peck basket full of apples 29 times. How many bushels of apples did he pick and how many pecks over?

5. If your tablet is 8 in. by 10 in., how many inch squares can you make on one page?

Written.

1. One box holds 2 dozen lemons, and another box holds 37 lemons. How many lemons are there in both boxes?

2. At 5 cents an ounce, what will a pound of candy cost?

3. Find the cost of 24 gallons of ink at 12 ¢ a pint.

4. What is the cost of 12 gal. 3 qt. of maple sirup at 40 ¢ a quart?

5. April, June, and November each have 30 days. How many hours are there in these months all together?

6. What number multiplied by 70 will make 1330?

7. In one city containing 21,000 families, $105,000 was given for Red Cross work in one week. How much was that for each family?

Make change for $1.00 in paying each of the amounts given below, thus: In I, *a*, say, " 12, 15, 25, 50, $1.00."

	I	II	III	IV	V	VI	VII
a.	$.12	$.14	$.16	$.13	$.15	$.19	$.11
b.	.25	.27	.29	.21	.22	.26	.28
c.	.31	.33	.35	.35	.32	.36	.38
d.	.48	.46	.44	.41	.43	.47	.49
e.	.56	.58	.52	.59	.57	.53	.51
f.	.61	.69	.67	.63	.64	.66	.62
g.	.76	.78	.77	.73	.71	.74	.79
h.	.81	.88	.83	.84	.85	.82	.89
i.	.95	.96	.99	.94	.93	.91	.92

Written. (For the strong pupils.)

In the numbers given above,

1. Add the amounts by columns.

2. Add the amounts from left to right in line *a*.

3. Add the sums of the columns.

4. Add the sums of the lines.

5. If the answer to 3 agrees with the answer to 4, what does it tell you about your addition?

6. Mr. Harlow bought 6 chairs at $18 a dozen, 8 tennis balls at 40 ¢ apiece, and 3 league balls at $1.25 each. How much money had he left from a $20 bill?

7. Emma had $3.50 with which to buy Christmas gifts. How much had she left after buying a tie for father, 58¢, two handkerchiefs for mother at 29¢ apiece, a book for brother, 45¢, a doll for sister, 47¢, bed-slippers for grandma, $1.10?

1. How many hours in 90 minutes?
2. How many seconds in $2\frac{1}{3}$ minutes?
3. What will 3 qt. of vinegar cost at \$.40 a gallon?
4. Give the multiplication tables of 7, 8, and 9.
5. Give the division tables of 7, 8, and 9.
6. Give the multiplication tables of 10, 11, and 12.
7. Give the division tables of 10, 11, and 12.
8. Two peaches at 2 ¢ apiece and 5 oranges at 3 ¢ apiece cost how much?
9. What will 18 lemons cost at \$.24 a dozen?
10. George sold 10 White Leghorn eggs and 14 Plymouth Rock eggs at \$.60 a dozen. How much did he receive for them?

Written.

1. Divide 8487 by 41.

$$\begin{array}{r} 207 \\ 41\overline{)8487} \\ \underline{82} \\ 287 \\ 287 \end{array}$$

28 tens will not contain 41 any tens' times, so we put 0 in tens' place in the quotient and bring down 7 units. 287 contains 41 seven times.

In these examples, think first what the guide figure is:

2. 21,112 ÷ 52. 5. 70,224 ÷ 28. 8. 56,160 ÷ 27.
3. 61,676 ÷ 68. 6. 5377 ÷ 19. 9. 399,294 ÷ 42.
4. 41,457 ÷ 39. 7. 21,137 ÷ 23. 10. 470,564 ÷ 94.
11. How many ounces in $6\frac{1}{2}$ lb.?
12. Subtract the sum of 486 and 296 from 1000.

1. Albert has $42 in the bank. Franz has $2\frac{1}{2}$ times as much. *a.* How many dollars has Franz? *b.* How many dollars have both?

2. A boy who is 12 years old to-day was born in what year?

3. If a boy earns $.48 in a week, what does he earn in 9 days at the same rate?

4. If a dozen pencils cost 18 cents, what must be paid for a box holding 6 dozen pencils? For 4 boxes?

5. A fruit dealer bought 32 boxes of berries for $2.56. *a.* How much did 1 box cost? *b.* He sold them at 12¢ a box. Did he gain or lose, and how much on 1 box? *c.* On all the boxes?

6. A lame boy rode on the car to and from school every day. His fare was 3 cents each way. *a.* What was his carfare for a week? *b.* If he was absent 5 days in a term of 20 weeks, how much was his carfare for the term?

7. If a street car makes 15 trips a day and carries 45 passengers at each trip, how many passengers are carried during the day?

8. Columbus discovered America in the year 1492. How long ago was that?

9. If a man earns $95 a month and spends $68 a month, how much does he save in a year?

10. 31 and 13 are the factors of what number?

11. A door mat 24 in. by 36 in. covers how many square inches of the floor?

Divide, and test your work by multiplication:

1.	45,521 ÷ 7.	**13.**	6,327 ÷ 9.	**25.**	15,573 ÷ 29.
2.	25,929 ÷ 3.	**14.**	25,140 ÷ 5.	**26.**	19,965 ÷ 33.
3.	15,368 ÷ 4.	**15.**	56,210 ÷ 7.	**27.**	9,198 ÷ 42.
4.	242,832 ÷ 4.	**16.**	7,518 ÷ 21.	**28.**	18,213 ÷ 39.
5.	86,335 ÷ 5.	**17.**	27,807 ÷ 31.	**29.**	39,216 ÷ 43.
6.	32,448 ÷ 6.	**18.**	10,563 ÷ 21.	**30.**	11,590 ÷ 38.
7.	7,912 ÷ 8.	**19.**	21,828 ÷ 51.	**31.**	42,834 ÷ 59.
8.	27,729 ÷ 9.	**20.**	43,524 ÷ 62.	**32.**	49,786 ÷ 62.
9.	28,266 ÷ 7.	**21.**	73,467 ÷ 81.	**33.**	70,798 ÷ 91.
10.	35,358 ÷ 6.	**22.**	19,341 ÷ 63.	**34.**	81,144 ÷ 92.
11.	8,352 ÷ 9.	**23.**	15,392 ÷ 52.	**35.**	55,528 ÷ 88.
12.	56,440 ÷ 8.	**24.**	37,281 ÷ 43.	**36.**	58,681 ÷ 83.

NOTE. — Practice in multiplication may be given from the above numbers by merely considering the sign to be changed from ÷ to ×. The numbers may be used for addition and subtraction by saying, "Add numbers from **1** to **6** or from **20** to **29**; subtract **35** from **34**, etc." Numbers on p. 165, and other pages, may be used in the same way.

PRACTICE IN ADDITION

Add both up and down. Time yourself.

1.	**2.**	**3.**	**4.**
5864	4763	9372	$ 94.87
9960	984	868	69.37
385	79	8754	.88
4237	638	7086	7.49
984	9705	399	923.86
865	8312	4209	79.89
7342	6098	1734	687.42

How long will it take you to get correct sums?

1.	2.	3.	4.	5.
837	628	8063	$ 26.43	$715.30
2964	4307	259	18.75	21.86
418	526	8264	2.93	9.24
3825	8279	1287	4.10	10.16
842	428	428	128.06	7.28
29	4273	3064	563.13	516.00

6. A package of butter containing $23\frac{1}{2}$ lb. costs how much at 30 ¢ a pound?

7. At $96 a month, how much can a man earn in 7 months?

8. How many quarts in 6 bushels?

9. At $1.28 a yard, what will 3 yd. of cloth cost?

10. How many minutes in 7 hours?

11.	12.	13.	14.	15.
5000	$40.12	$25.00	$38.42	495
−479	−37.84	− ?	+ ?	×99
		$23.59	$96.39	

Oral.

1. Name all the letters we have used in Roman notation and give the value of each.

2. Read 240, 361, 405; 1072, 610.

3. Count by 7's from 3 to 87.

4. Read XVII.

5. How many dozen are 108 eggs?

1. We have learned that division may be indicated by writing the *dividend above* a line and the *divisor below* the same line; thus: $\frac{12}{3} = 12 \div 3 = 4$; $\frac{15}{5} = 3$.

2. Give the quotients: $\frac{45}{5}$; $\frac{81}{9}$; $\frac{144}{12}$; $\frac{240}{10}$; $\frac{69}{3}$; $\frac{220}{20}$.

When the dividend does not contain the divisor an exact number of times, the remainder is written over the divisor, as a fraction; thus: $\frac{38}{9} = 4\frac{2}{9}$.

This means that there are four 9's in 38, and 2 over, or, that the quotient of 38 divided by 9 is $4\frac{2}{9}$.

3. *Find the quotients:* $\frac{13}{2}$; $\frac{14}{3}$; $\frac{21}{4}$; $\frac{16}{3}$; $\frac{23}{4}$; $\frac{83}{9}$; $\frac{113}{16}$; $\frac{45}{10}$.

Written.

1. Divide 26,680 by 35.

$$
\begin{array}{r}
762 \\
35\overline{)26670} \\
245 \\
\hline
217 \\
210 \\
\hline
70 \\
70
\end{array}
$$

35 is midway between 30 and 40. 3 is contained in 26 eight times. 4 is contained in 26 six times. So the first quotient figure is between 6 and 8, or 7. In a similar manner we get 6 for the second figure of the quotient.

2. $8675 \div 25$ (use 2 and 3 for guide figures).

3. $3082 \div 46$ (use 4 and 5 for guide figures).

Find the quotients: [1]

4. $\frac{2210}{65}$ 5. $\frac{2035}{55}$ 6. $\frac{2700}{75}$ 7. $\frac{3445}{65}$ 8. $\frac{875}{35}$

9. $\frac{1890}{45}$ 10. $\frac{2788}{34}$ 11. $\frac{3315}{85}$ 12. $\frac{33488}{46}$ 13. $\frac{51595}{85}$

[1] Examples 4 to 13 should be read, "2210 divided by 65," etc. They involve no operations with fractions.

1. How many quart boxes can be filled from 25 bu. of plums?

2. $\frac{1}{2}$ bu. = —— qt. How many half-bushel baskets could be filled from 288 qt. of chestnuts?

3. A four-gallon can holds —— qt. How many four-gallon cans could be filled from 272 qt. of oil?

4. If William earns \$16 a month, how many months must he work to earn \$576?

5. See how quickly you can get correct answers:
a. 3421×45 *b.* 4326×51 *c.* 5678×55 *d.* 9834×43

6. Find quotients and remainders and test your work:
a. $5\overline{)393}$ *b.* $6\overline{)497}$ *c.* $7\overline{)899}$ *d.* $8\overline{)943}$ *e.* $9\overline{)4875}$

7. How many pounds in 2112 oz.?

8. 42 lb. and 12 oz. are how many ounces?

9. At 10¢ a quart what will 65 gal. of milk cost?

10. One factor of 675 is 15. What is the other?

11. In 3600 seconds how many minutes?

12. Find quotients and remainders and test your work:
a. $439 \div 13$ *b.* $513 \div 14$ *c.* $1835 \div 8$ *d.* $459 \div 7$

13. Find: *a.* $\frac{2}{3}$ of 675; *b.* $\frac{3}{4}$ of 732; *c.* $\frac{2}{5}$ of 580.

14. Multiply: *a.* 472 by 69; *b.* 803 by 105.

15. Divide: *a.* 8230 by 20; *b.* 7960 by 40.

16. Find the number of hours in the month of October.

17. Find the number of minutes in the month of October.

1. Find the quotient of $\frac{29366}{49}$.

$599\frac{15}{49}$ *Quotient*	PROOF
$49\overline{)29366}$	$599\frac{15}{49}$ *Quotient*
245	$\times$ 49 *Divisor*
486	5391
441	2396
456	29351
441	+15 *Remainder*
15	29366 *Dividend*

There is a remainder of 15, which shows that 29,366 is 15 more than the product of 599 and 49.

Find the quotients in the following. Test your work by multiplying the whole number in the quotient by the divisor, and adding the remainder. This is not fraction work.

2. $\frac{27938}{57}$	3. $\frac{6294}{83}$	4. $\frac{7209}{18}$	5. $\frac{6420}{42}$
6. $\frac{7483}{56}$	7. $\frac{18736}{54}$	8. $\frac{56803}{92}$	9. $\frac{9063}{50}$
10. $\frac{6284}{59}$	11. $\frac{92307}{36}$	12. $\frac{53124}{72}$	13. $\frac{9650}{87}$
14. $\frac{6004}{29}$	15. $\frac{37561}{46}$	16. $\frac{25964}{38}$	17. $\frac{8329}{31}$
18. $\frac{40136}{24}$	19. $\frac{50601}{87}$	20. $\frac{80319}{75}$	21. $\frac{29006}{27}$
22. $\frac{57764}{28}$	23. $\frac{14245}{35}$	24. $\frac{71500}{69}$	25. $\frac{11988}{14}$
26. $\frac{64188}{33}$	27. $\frac{41213}{13}$	28. $\frac{5681}{15}$	
29. $\frac{31053}{65}$	30. $\frac{888}{12}$	31. $\frac{27685}{16}$	

32. If an American torpedo-boat destroyer can travel 32 miles an hour, in how many hours will she travel 478 miles?

33. 2000 ounces of raisins will fill how many pound packages?

1. Count by 3's from 2 to 101 and back.

2. 33 Brazil nuts were given to a boy and his two sisters. How many apiece had they, if the nuts were divided equally?

3. Joseph raised 42 ducks and sold 15. How many had he left?

4. A half-dollar, two quarters, a dime, and two nickels are how much money?

5. Max earned \$32. He paid \$12 for a suit and \$9 for an overcoat. How much had he left?

6. What must be paid for 4 dozen peaches at 2¢ each?

7. What coins make change for 38¢ from \$1?

8. Mr. Finch picked 39 plums and divided them equally among his three sons. How many did Frank and George receive?

Written.

1.	2.	3.	4.
\$41.72	\$86.05	\$32.65	\$48.37
$\times 8$	$\times 6$	-14.87	$-?$
			\$19.48

5. Mr. Castle earns \$20 a week. If he pays \$.95 a day for board and \$1.15 a day for other things, how much can he save in a week?

6. Divide the product of 27 and 32 by their sum.

7. Reuben earned \$21.36. His sister gave him enough to put with it so that he could buy a bicycle for \$28.00. How much did his sister give him?

8. One factor of 7659 is 37. What is the other?

9. $\frac{4360}{40}$ 10. $\frac{9480}{30}$ 11. $\frac{301000}{700}$ 12. $\frac{15779}{31}$

1. A dressmaker bought $4\frac{3}{4}$ dozen buttons. When she has used 20 of them, how many are left?

2. $\frac{19 + 7 + 8 + 6}{10} = ?$ $\frac{12 + 6 - 8}{5} = ?$

3. What does a year's rent amount to at $12 a month?

4. What is the amount of 6 months' rent at $120 a year? Can you find it in two ways?

5. 3 yd. of gas pipe at 8 cents a foot cost how much?

6. —— × —— = 84; —— × —— = 132.

7. Six feet of chain at 12 ¢ a foot cost how much?

8. The multiplicand is 42, the multiplier 2. What is the product? Make a problem.

Written.

1. Mr. Graves receives a salary of $1404 per year. That is how much a month?

2. A farmer sold 235 lb. of butter at $.34 a pound and bought a barrel of sugar for $15.75. How much money had he left?

3. How many bushels of wheat will a farmer raise in 7 years if he raises 98 bushels every year?

4. In how many days can your father earn $585 if he earns $5 a day?

5. 37 and 459 are the factors of what number?

6. How many tons of coal can be put in a bin that will hold 28,000 pounds?

7. Write in words 400,216.

1. From a piece of meat weighing 30 ounces, $\frac{3}{4}$ of a pound was cut. How many ounces remained?

2. Hazel paid 12 cents for buttons at 24 cents a dozen. How many did she buy? How many could she buy for 48 cents?

3. A rectangle contains 54 square inches. It is 9 inches long. Give the question.

4. Charlotte practices music three hours every day. What part of all the time does she practice?

5. What part of a minute is 12 seconds?

6. Give two factors of 63; of 96; of 48.

7. Our family uses a half gallon of milk every day at $.09 a quart. Give the question and answer.

Written.

1. Multiply XIX by XV, expressing the work in figures.

2. Two boys sold extracts and shared the profits equally. The first week they took in $17.25. Their extracts cost them $9.55. How much did each boy make?

3. Mr. Banker bought a pony for $142, a cart for $25, a harness for $13.50, and robes, blankets, etc., for $19.75. What did they all cost?

In examples **4–11**, *find the quotients and test your work:*

NOTE. — Remember this is not fraction work, but long division.

4. $\frac{3486}{19}$ 5. $\frac{97603}{23}$ 6. $\frac{15789}{65}$ 7. $\frac{84936}{93}$

8. $\frac{47630}{88}$ 9. $\frac{12903}{66}$ 10. $\frac{12750}{125}$ 11. $\frac{82493}{53}$

1. Without measuring, draw a line 4 in. long; measure and correct it; a line 9 in. long; $1\frac{1}{2}$ ft.

2. Estimate the width and height of doors, windows, blackboards, ventilators, etc., then measure and see who is most nearly correct.

3. A bushel and 9 qt. are how many quarts?

4. $\frac{1}{2}$ in. = how many fourths of an inch? Eighths?

5. $\$\frac{3}{4} + \$\frac{1}{4} = ?$ $\$\frac{1}{2} + \$\frac{1}{4} = ?$

6. What is the time when the minute hand is at IX and the hour hand is between XI and XII? (Picture.)

7. Express in words: 3, 408, 700.

Written.

1. *Add up, then down. Time yourself.*

a.	*b.*	*c.*	*d.*	*e.*
123	\$ 6.34	903	4836	\$ 5.86
12	83.59	74	539	9.73
3	12.70	973	46	81.29
456	893.98	460	930	40.00
89	24.57	23	89	1.72
45	806.93	58	98	19.38

2. Indicate the sum of 921 and 33 divided by 106.

3. Indicate the product of 1728 and 144 less 5184.

4. Five children have deposited in the school bank these amounts: \$16.75, \$11.86, \$4.95, \$12.65, and \$3.25. What is the sum of their deposits?

5. When hops are \$.25 a pound, what should a farmer receive for 3000 lb. of hops?

6. Find the quotient of: *a.* $\frac{94376}{91}$; *b.* $\frac{4689}{46}$; *c.* $\frac{263255}{65}$.

423,578,600 is read, *four hundred twenty-three million, five hundred seventy-eight thousand, six hundred.*

1. *Read:* 125,791,235; 26,625,130; 4,310,240; 99,000,000; 600,329,842; 100,000,125.

Find results and read them:

2. *Multiply by* 10: 14; 28; 79; 192; 345.
3. *Multiply by* 100: 210; 980; 6004; 4250.
4. *Multiply by* 1000: 13; 25; 49; 324; 20.
5. *Divide by* 1000: 98,000; 1,239,000.
6. 569×3200.
7. 423×600.
8. 507×500.
9. 938×240.
10. 5803×9000.
11. 256×8500.
12. 2038×490.
13. 950×2400.
14. $3{,}812{,}400 \div 900$.
15. $180{,}960 \div 520$.
16. $50{,}040 \div 60$.
17. $308{,}000 \div 800$.

18. The sun is 92,000,000 miles from the earth. *a.* If you could travel toward the sun at the rate of 40 miles an hour, you would have to travel how many hours to reach it? *b.* If you should travel 10 hours a day, how many days must you travel to reach the sun?

19. The distance around the earth is 25,000 miles. If you travel 50 miles an hour, how many hours must you travel to go around the earth?

1. XXI = 20 + 1 = 21. XXII = 20 + 2 = ? XXIII = ? XXIV = 20 + 4 = 24.

2. XXV = 20 + 5 = 25. XXVI = 20 + 6 = 26. XXVIII = 20 + 8 = ?

3. XXIX = 20 + 9 = 29. XXX = 10 + 10 + 10 = ? XXXI = 31. XXXII = ?

4. XXXIII = 30 + 3 = 33. XXXIV = 30 + 4 = 34. XXXV = ?

5. XXXVI = 30 + 6 = 36. XXXVII = 30 + 7 = ? XXXVIII = ?

6. 39 = 30 + 9. Write it in Roman.

7. L = 50. LI = 51. LIV = 50 + 4 = ?

8. Write 55 in Roman. Write 56, 57, 58, 59.

9. XL = 50 − 10 = ? XLI = 40 + 1 = ? XLII = ?

10. Write in Roman 43, 44, 45, 46, 47, 48, 49.

11. LX = 50 + 10 = ? LXV = ? Write 66, 68, 69.

12. LXX = 50 + 20 = ? Write 72, 74, 75, 76, 78, 79.

13. LXXX = 50 + 30 = ? Write 81, 83, 84, 86, 87, 89.

14. C = 100. XC = 100 − 10 = 90. XCII = 90 + 2 = ?

15. Write 93, 94, 95, 96, 97, 98, 99.

Read the following examples in class.

Copy them in figures and find the products.

16. XXVIII × IV. 17. XIX × III. 18. XL × V.

19. LV × IV. 20. LXV × III. 21. XLIV × VI.

22. LXXVIII × III. 23. XCVII × II. 24. XCIV × IV.

25. LXXXIX × III. 26. XLIX × II. 27. LIX × V.

I. *Add up, and test by adding down.* (6 minutes)

1.	2.	3.	4.
387	4678	$34.25	$637.45
4598	999	6.97	89.30
694	384	15.09	90.
7832	7963	76.38	8.38
6709	894	7.95	97.60
12345	29	39.87	706.95
7864	387	6.89	98.39
308	9679	99.38	456.78
78390	778	69.49	87.35

II. *Subtract and test by addition:*

1.	2.	3.	4.
20379	33954	$537.86	$593.76
8385	12987	29.39	98.34

III. *Problems:*

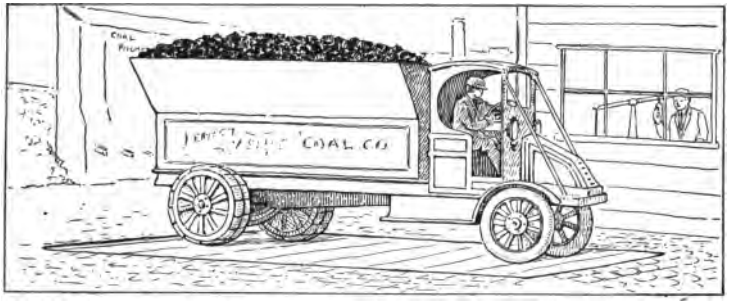
1. The attendance at the Panama Pacific Exposition for eight days was as follows: 68,342; 51,790; 73,482; 33,476; 81,379; 59,885; 48,733; 65,619. What was the total for the eight days?

2. I have 15 five-dollar bills, 12 two-dollar bills, and 13 silver dollars. How much money have I?

3. Victor earned $15. He paid $5.50 for a suit, $1.00 for a hat, and $2.50 for shoes. How much money had he left?

4. My grandfather is 78 years old to-day. In what year was he born?

5. 729,348 is how much greater than 529,839?



There are **2000 pounds** in one **ton** (T.)

One horse can draw a ton of coal. A two-horse load of coal contains two or three tons.

Farmers take to market about one ton of hay at a load; two tons if baled.

An automobile weighs a little more or less than a ton.

Can you think of something else that weighs about one ton?

1. How many pounds in 2 T. of coal? In 7 tons? In 12 tons? In $\frac{3}{4}$ of a ton? In $\frac{1}{2}$ ton? In $\frac{1}{20}$ of a ton? In $6\frac{1}{2}$ tons?

2. A load of iron rails weighs 3 tons. The wagon weighs 1250 lb. The horses weigh 2600 lb. The bridge across which the load is drawn must be strong enough to hold up —— pounds.

3. A car load of coal weighs 68,000 lb. How many wagon loads of 2 T. each will it make?

4. Mrs. Allen bought a quarter of a ton of coal. How many pounds did she buy?

5. A ton of butter was packed in pails holding 50 lb. each. How many pails were used?

1. 20 bales of cotton, each containing 500 lb., weigh how many pounds? How many tons?

2. 1000 lb. is what part of a ton? 500 lb.?

3. How many pounds in 5 T.? 7 T.? 21 T.?

4. A ton of hay was pressed into bales weighing 125 pounds apiece. How many bales were there?

ONE HUNDRED PER CENT RECORD

Names of All Pupils in Fourth Grade	Addition Table	Subtraction Table	Multiplication Table	Column Addition to 50	Oral Division	Mult. by 100, 1000, etc.	Short Division	Mult. by 1 Figure	Mult. by 2 Figures	Division by 2 Figures	Written Subtraction	Area Problems	Roman Numerals	Writing Numbers	Reading Numbers	All Topics
Helen Adams	x	x		x										x	x	
Frank Brown	x			x		x							x			
Alice O'Neil	x	x			x				x	x				x	x	
Jacob Weiss	x	x		x											x	
Etc.																

The above device has proved an inspiration to many children. Let the form be placed on the blackboard, or on a large card, hung upon the wall. Enter all names at the beginning. Permit children to come and ask for a test in any topic before or after school or at other times designated by the teacher. Check the topics as soon as a perfect test has been made.

For example, the above record shows that Helen Adams has passed perfect tests in the addition table, subtraction table, column addition to 50, writing numbers, and reading numbers. She still has ten tests to take.

A poor student may have courage to conquer one difficulty at a time, when he sees his perfect record accumulating. The list of topics may be varied indefinitely, and new ones added when one record is complete. Some topics should be easy, so as to give the weaker pupils a start.

1. On the blackboard, make a square 1 ft. wide. How long is it? What is it called? Describe a square foot.

2. Make a rectangle 3 ft. by 7 ft. How many square feet (*sq. ft.*) does it contain? Mark off the square feet in the rectangle.

3. How many square feet in an oblong 9 ft. by 8 ft.? 7 ft. by 12 ft.? 11 ft. by 12 ft.? 6 ft. by 7 ft.?

4. Measure the length and breadth of your schoolroom and find the number of square feet in the floor.

NOTE. — Length and breadth are dimensions.

5. The floors in our house are rectangles and have the following dimensions:

Reception room	12 ft. by 11 ft.
Dining room	13 ft. by 16 ft.
Library	18 ft. by 13 ft.
Hall	8 ft. by 18 ft.
Kitchen	12 ft. by 14 ft.

a. Find the number of square feet in each of the floors. *b.* In all the floors. Draw the hall, using $\frac{1}{4}$ in. for 1 ft.

6. Measure the top of your desk and find the number of square inches it contains. (Omit fractions.)

7. Mr. Fancher's sidewalk is 5 ft. wide and 66 ft. long. What did it cost at 11¢ per square foot?

8. What would it cost to put an oak floor in the library (problem 5) at 17¢ per square foot?

9. A skating rink 98 ft. by 212 ft. contains how many square feet?

(Review pages 162, 163, and 164.)

1. Hold your hands 1 yd. apart. Hold your hand one yard above the floor. Without a rule, draw on the blackboard a square one yard long. How wide is it? Measure and correct it. Describe a **square yard.**

2. The top of your teacher's desk contains about how many square yards (*sq. yd.*)?

3. Estimate the number of square yards in the floor of your schoolroom. Measure and see how nearly right you are.

4. A courtyard is 12 yd. wide and 43 yd. long. How much would it cost to pave it at $2 a square yard?

The number of square units (*square yards, square feet, square inches,* etc.) *that a surface contains is its* **area.** How do we find the *area* of a rectangle?

5. When the area and one dimension of a rectangle are given, how may we find the other dimension?

6. The area of a dining table is 36 sq. ft. Its width is 4 ft. What is its length? Draw it, using $\frac{1}{2}$ in. for 1 ft.

7. A pane of glass is 28 in. by 32 in. What is its area?

8. Measure a floor in your house and compute the area. Make a drawing, using $\frac{1}{4}$ in. for 1 ft.

9. 1 mile = 5280 ft. A pavement 1 mile long and 50 ft. wide contains how many square feet?

10. A mile is 1760 yd. How many square yards in a street 1 mile by 20 yd.?

A number that can be exactly divided by **2** *is an* **even number**; as, 2, 4, 6, 8, 10.

A number that cannot be exactly divided by **2** *is an* **odd number**; as, 1, 3, 5, 7, 9, 11.

1. Divide 98 by 2. What is the remainder? What kind of a number is 98?

2. Divide 97 by 2. What is the remainder? What kind of a number is 97?

3. Write all the odd numbers from 1 to 99.

4. Write all the even numbers to 100.

5. What are the unit figures in the even numbers? In the odd numbers?

6. At how many figures of a number must you look to tell whether it is odd or even?

7. Tell which of the following numbers are odd and which are even: 9, 12, 16, 15, 14, 27, 29, 36.

8. What factor does an even number always contain?

9. In what kind of a number is the factor 2 never found?

10. *Tell which of the following numbers are odd and which are even:*

The number of

a. Pints in a quart.
b. Cents in a half dime.
c. Quarts in a peck.
d. Minutes in $\frac{1}{4}$ hr.
e. Hours in $\frac{3}{8}$ da.
f. Inches in a foot.
g. Quarts in $\frac{1}{4}$ gal.
h. Square inches in a 5-inch square.

We have learned that the *multiplier* and *multiplicand* are **factors** of the *product*, and that the *divisor* and *quotient* are **factors** of the *dividend*.

If you have the product and one of its factors, how can you find the other factor?

If you have the dividend and one of its factors, how can you find the other factor?

> *One of the numbers that are multiplied to produce a number is a* **factor** *of that number.*

So small a number as 2 has factors, for $2 \times 1 = 2$. What are the factors of 2?

In telling the factors of a number, we do not mention the factor 1, because 1 is a factor of every number.

1. Give two factors of 6; 9; 10; 14; 15; 21; 25; 22; 33; 34; 35; 38; 39; 49; 63; 72.

2. Of what number are 12 and 11 factors?

3. $2 \times 3 \times 5 = ?$ Give three factors of 30.

4. $7 \times 2 \times 5 = ?$ Give three factors of 70.

5. Name all the numbers that will divide 9; 8; 10; 11; 12; 13; 14.

6. 5 and 2 are factors of 30. What other factors has 30?

7. Complete the following statements and tell which numbers are products and which are factors:

a. 8 pints = —— quarts.

b. 5 dozen copy books are —— copy books.

c. 4 bushels = —— pecks.

d. 5 apples, at 2 ct. each, cost —— ct.

e. $9 \times$ —— = 108.

1. $25 \times 10 = ?$

2. Give two factors of 35.

3. Write the even numbers to 20.

4. There are 120 seconds in 2 minutes. What factor is not given?

5. A sheet of wrapping paper 6 ft. by 2 ft. contains how many square feet?

6. 2 pounds equal how many ounces?

7. Dan bought a half peck of peanuts at 5 cents a quart. Give the question and answer.

8. The area of a window shade is 21 square feet. Its length is 7 ft. Which number is the product? What are its factors?

9. If you sleep $\frac{3}{8}$ of the time, how many hours a day do you sleep?

10. 20 min. is what part of an hour?

Oral.

Complete the following statements and tell which numbers are products and which are factors:

11. 32 ounces are —— pounds.

12. At \$12 a week, a man can earn \$96 in —— weeks.

13. A floor is 12 ft. long and 11 ft. wide. Its area is ——.

14. A man's salary for 10 years amounts to \$15,000. He receives —— dollars per year.

15. At 25 cents per week, Roger should receive —— for sweeping Mr. Abel's sidewalk 4 weeks.

1. 12 is what of 4 and 3? When 4 and 3 are given, how can you get 12? When 12 and 4 are given, how can you get 3? When 12 and 3 are given, how can you get 4? 4 and 3 are what of 12?

2. At 12 cents apiece, what will 5 pineapples cost? Which numbers are factors? What is the product?

3. If 5 pineapples cost 60 cents, how can you find the cost of 1 pineapple? If 1 pineapple costs 12 cents, how can you find the number of pineapples that 60 cents will buy? 5 and 12 are what of 60? 60 is what of 5 and 12?

4. When two factors are given, what do you do to find the product? When the product and one factor are given, what do you do to find the other factor?

In each of the following problems, tell what is given and what is to be found (see question **4**):

5. What is the area of a rectangle 4 ft. by 9 ft.?

6. If Clarence earns 12 cents every week, in how many weeks will he earn 84 cents?

7. There are 4 pecks in a bushel. How many pecks in 11 bushels?

8. 7 days make a week. How many weeks in 63 days?

9. $4371 \div ? = 47$. **10.** $75 \times ? = 2025$. **11.** $38 \times 99 = ?$

12. If \$5.10 is divided equally among 3 boys, how much money will each receive?

13. An apple tree bore 128 bushels of apples in 16 years. How many bushels did the tree bear each year?

1. $2 \times 3 = ?$ 6 contains 3 how many times? 6 contains 2 how many times?

2. $3 \times 5 = ?$ 15 contains 3 how many times? 15 contains 5 how many times?

3. $5 \times 7 = ?$ 35 contains 7 how many times? 35 contains 5 how many times?

4. $44 \div 4 = ?$ $44 \div 11 = ?$ 44 is what of 4 and 11?

A number that exactly contains another number is a **multiple** *of that number, e.g.:*

35 is a multiple of 7 because it exactly contains 7.

5. Name a multiple of 2; of 3; of 5; of 7; of 4.

6. Name two numbers of which 6 is a multiple.

7. Nine is a multiple of what?

8. Every even number is a multiple of what?

9. A number that is not a multiple of 2 is what kind of number?

10. 6 is a multiple of what two numbers?

11. Give all the multiples of 2 up to 30.

12. Give all the multiples of 3 up to 36; of 5 up to 60; of 4 up to 48; of 6 up to 72; of 7 up to 84.

13. How many different numbers will divide 36?

14. The number of cents that 8 tops will cost at 5¢ apiece is a multiple of what?

15. 77 is a multiple of 7. It is a multiple of what other number?

16. What is the smallest number of apples that you could divide equally among either 3 boys or 2 boys without cutting any of the apples?

USED BY FOURTH GRADE TEACHERS

1. Get children to *read* problems and know what is given and what is required before using a pencil. Most children like to "start right in" to work the problem before reading it intelligently.

2. Have the pint, quart, and gallon measures in the schoolroom and use them; also foot rule, yardstick, pound weight, etc.

3. A picture for everything helps.

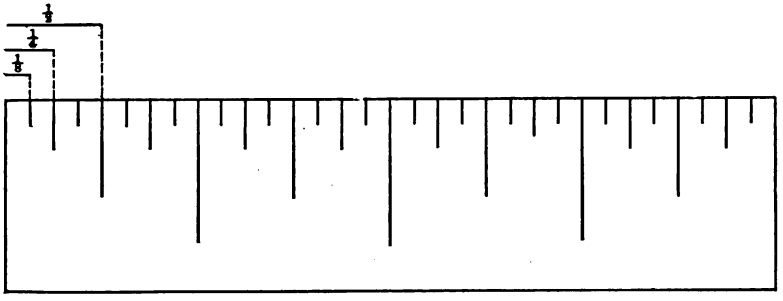
4. Device for quick oral work and drill in tables of denominate numbers: Take some number, as 5; multiply it by the number of days in a week; by the number of quarts in a gallon; by the number of pints in a gallon, etc.

5. Dramatize each written problem just as a paragraph in reading may be dramatized.

6. To teach a problem like this: "How many coal cars 31 feet long would make a train 1395 feet long?" give an oral problem as, "If each car is 31 feet long, how many cars would reach 62 feet?" How did you find it?

7. Let capable pupils give extra time to pupils who are weak in arithmetic and need more practice in doing the work. This helps both the weak and the strong pupil.

8. Use practice work in multiplication, long division, or any other simple process as a reward for excellent work and attention during certain periods. For instance, "Let us see how well we can have our lessons and how quickly we can recite this afternoon so as to have a 'relay race' in arithmetic." Prepare cards or slips of paper, each containing an example. Give a card to each pupil. Divide blackboard into as many spaces as rows of seats. At signal to begin, first pupil in each row comes to board and works his example. As soon as he has finished, next pupil follows, working his own example and correcting any mistake made by his predecessors. The row finishing first, with all work correct, wins the race. If certain rows have fewer pupils than others, let some pupils take two slips. Only one kind of examples should be used in one race. Many kinds may be used for successive games, for instance, addition, subtraction, multiplication, division, Roman numerals, finding any part of a number, making change, etc. Keep a cumulative record of games, like a baseball league record.



1. How many *inch* spaces are there on this rule? How many *half-inch* spaces in 1 inch? In the whole rule?

2. How many $\frac{1}{4}$-*inch* spaces in 1 inch? In the whole rule? In $\frac{1}{2}$ inch? How many quarters in an inch?

3. How many $\frac{1}{8}$-inch spaces in 1 inch? In the whole rule? In $\frac{1}{2}$ inch? In $\frac{1}{4}$ inch?

4. 1 *inch* = how many *half inches?* How many $\frac{1}{4}$ *inches?* How many $\frac{1}{8}$ *inches?* 1 inch = $\frac{?}{2}$ = $\frac{?}{4}$ = $\frac{?}{8}$.

5. How many quarter inches in one half inch? How many $\frac{1}{8}$ inches in one half inch? $\frac{1}{2}$ inch = $\frac{?}{4}$ = $\frac{?}{8}$.

6. How many $\frac{1}{8}$ inches in $\frac{1}{4}$ inch? $\frac{1}{4}$ inch = $\frac{?}{8}$.

7. Two half inches are how many inches? 4 half inches? 6 half inches? 3 half inches?

8. $\frac{2}{8} = \frac{1}{?}$; $\frac{4}{8} = \frac{1}{?}$; $\frac{8}{8}$ make what? $\frac{2}{4} = \frac{1}{?}$.

9. $\frac{1}{2}$ inch and $\frac{1}{4}$ inch make $\frac{?}{4}$ inch; $\frac{1}{2} + \frac{1}{4} = ?$

10. $\frac{1}{4}$ inch and $\frac{1}{8}$ inch make $\frac{?}{8}$ inch; $\frac{1}{4} + \frac{1}{8} = ?$

11. $\frac{1}{2}$ inch and $\frac{1}{8}$ inch make $\frac{?}{8}$ inch; $\frac{1}{2} + \frac{1}{8} = ?$

12. $\frac{1}{2}$ inch and $\frac{1}{4}$ inch make $\frac{?}{8}$ inch; $\frac{1}{2} + \frac{1}{4} = \frac{?}{8}$.

13. Which is greater, $\frac{1}{2}$ or $\frac{1}{4}$? $\frac{1}{4}$ or $\frac{1}{8}$? $\frac{1}{4}$ or $\frac{2}{8}$?

1. On the rule (p. 195), find $\frac{1}{2} + \frac{1}{2}$; $\frac{1}{4} + \frac{1}{4}$; $\frac{1}{8} + \frac{1}{8}$; $1\frac{1}{2} + \frac{1}{2}$; $3\frac{1}{2} + \frac{1}{2}$; $1\frac{1}{2} + 2\frac{1}{2}$.

NOTE. — Children use their own rules also.

2. Find $1\frac{1}{4} + \frac{1}{4}$; $1\frac{1}{4} + 2\frac{1}{4}$; $1\frac{1}{2} + \frac{1}{2}$; $1\frac{3}{4} + \frac{1}{4}$; $1\frac{3}{4} + \frac{1}{2}$.

3. Find $1\frac{3}{4}$, then take away $\frac{1}{4}$. What is left?

4. Find $2\frac{3}{4}$, then take away $\frac{1}{2}$. What is left?

5. $2 + 3 = ?$ $\frac{1}{2} + \frac{1}{2} = ?$ $2\frac{1}{2} + 3\frac{1}{2} = ?$ $\frac{1}{2} + \frac{1}{4} = ?$

6. $\frac{3}{4} + \frac{1}{4} = ?$ $6 + 2 = ?$ $6\frac{3}{4} + 2\frac{1}{4} = ?$ $5\frac{3}{4} - \frac{1}{4} = ?$

7. Mary has a hand mirror 4 in. by $6\frac{1}{2}$ in. How many square inches does it contain? (Picture.)

8. If the mirror is 3 in. wide and contains 15 sq. in., how long is it? (Picture.)

9. A traveler paid \$.25 for breakfast, \$.50 for dinner, \$.35 for supper, and \$.75 for lodging. What did his meals and lodging for the day cost him?

10. If 5 pears cost 15 cents, 10 pears will cost twice as much, or —— cents. Why?

11. 20 pencils cost 60 cents. Five pencils cost $\frac{1}{4}$ as much, or —— cents. Why? In what other way could you get it?

12. If 2 quarts of milk cost 20 cents, 2 gallons would cost —— times as much, or —— cents. Why?

13. Henry earned 40 cents in 5 hours. How much could he earn in 10 hours? Find it in two ways.

14. Grace can solve 4 problems in 12 minutes. How many can she solve in 48 minutes? Find it in two ways.

15. At 2 cents a foot, what will 6 yd. 2 ft. of rope cost?

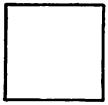


FIG. 1

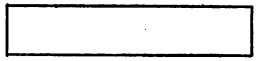


FIG. 2

FIG. 3

1. Measure the four sides of Figure 4. Add them.

2. Measure the sides of Figure 5. Add them.

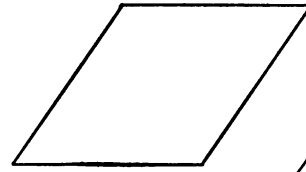


FIG. 4

The sum of all the sides of a figure is its **perimeter.**

3. Find the perimeter of Figure 1; of Figure 3; of Figure 2.

4. Draw on the blackboard a square 9 in. on a side. *a.* Its perimeter is how many inches? *b.* How many feet?

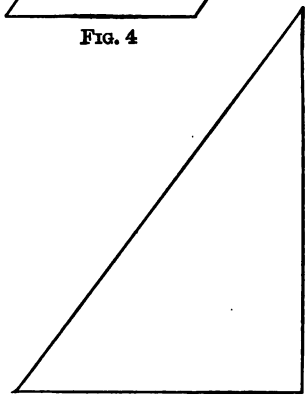


FIG. 5

5. Draw a square whose perimeter is 48 in. How many inches long and wide must it be?

6. Measure your paper and find its perimeter.

7. Draw on the blackboard a rectangle 2 ft. long and 6 in. wide. Find its perimeter.

8. A garden bed is 12 ft. long and 8 ft. wide. Make a drawing of it, using $\frac{1}{2}$ in. for 1 ft. Find the perimeter.

9. A city lot is 150 ft. long and 50 ft. wide. What is its perimeter? Draw it, using 1 in. for 50 ft.

1. Review page 195.

2. Florence bought $\frac{1}{2}$ lb. of caramels, $\frac{1}{2}$ lb. of peppermints, and $\frac{1}{2}$ lb. of butter scotch. How many pounds of candy did she buy?

3. What are 10 pocket knives worth at $\$\frac{1}{2}$ apiece?

4. What are 20 knives worth at $\$\frac{1}{4}$ apiece?

5. Cut a pie into 8 equal pieces. What part of the pie is 1 piece? (Picture.)

How many pies, each cut into 8 pieces, are needed to serve 24 people? $\frac{24}{8} = ?$

6. Cut a pie into quarters. Give a piece to each of two boys. What part of the pie is gone? What part is left? (Picture.) $\frac{2}{4} = ?$

7. Give half a pie to John and $\frac{1}{4}$ to Nellie. What part is gone? What part is left? (Picture.) $\frac{1}{2} = \frac{?}{4}$.

8. Cut a pie into 8 pieces. Give $\frac{1}{2}$ to Henry (How many pieces?) and $\frac{1}{8}$ to Frank. What part is gone? What part is left? (Picture.)

$\frac{1}{2} + \frac{1}{8} = \frac{?}{8} + \frac{1}{8} = ?$ $\frac{1}{2} + \frac{3}{8} = ?$ $\frac{1}{4} + \frac{1}{8} = ?$

Make a picture of 4 pies cut into 8ths. Each piece is $\frac{1}{?}$. How many pies do 8 pieces make? 16 pieces? 24 pieces? 32 pieces? $\frac{8}{8} = ?$ $\frac{16}{8} = ?$ $\frac{32}{8} = ?$

9 pieces make how many pies? 11 pieces? 13 pieces? 15 pieces? 31 pieces? $\frac{9}{8} = ?$ $\frac{13}{8} = ?$ $\frac{15}{8} = ?$

10 pieces are how many pies? 12 pieces? 20 pieces? 28 pieces? $\frac{10}{8} = ?$ $\frac{12}{8} = ?$ $\frac{20}{8} = ?$

How many pieces in $\frac{1}{4}$ of a pie? $\frac{1}{2}$? $\frac{3}{4}$? $\frac{1}{4} = \frac{?}{8}$?

1. *a.* 24×10	**2.** *a.* 12×70	**3.** *a.* 46×20
b. 45×100	*b.* 16×30	*b.* 15×40
c. 16×20	*c.* 420×20	*c.* 12×600
d. 18×20	*d.* 51×100	*d.* 15×50
e. 30×10	*e.* 7×1000	*e.* 90×100

4. *a.* $160\div10$	**5.** *a.* $80\div40$	**6.** *a.* $600\div300$
b. $230\div10$	*b.* $280\div40$	*b.* $800\div200$
c. $40\div20$	*c.* $250\div50$	*c.* $1800\div900$
d. $80\div20$	*d.* $420\div70$	*d.* $36000\div9000$
e. $100\div20$	*e.* $860\div20$	*e.* $720\div120$

7. A pail weighs $1\frac{3}{4}$ pounds, the cover $\frac{1}{4}$ pound, and the contents of the pail 20 pounds. If you carry it, how many pounds must you carry?

8. If George gained $5\frac{3}{4}$ lb. during vacation and lost $\frac{1}{2}$ lb. during the first week of school, how much heavier is he than when the vacation began?

ADDITION AND SUBTRACTION

9. *a.* $2\frac{1}{2}+\frac{1}{2}$	**10.** *a.* $7\frac{1}{4}+3\frac{1}{4}$	**11.** *a.* $2\frac{3}{4}+9\frac{1}{4}$
b. $3\frac{1}{2}+1\frac{1}{2}$	*b.* $5\frac{3}{4}+1\frac{1}{4}$	*b.* $6\frac{1}{2}-\frac{1}{2}$
c. $7\frac{1}{2}+8\frac{1}{2}$	*c.* $2\frac{5}{8}+\frac{3}{8}$	*c.* $7-\frac{1}{2}$
d. $4\frac{1}{2}+8\frac{1}{2}$	*d.* $7\frac{1}{2}+\frac{1}{4}$	*d.* $8\frac{1}{2}-3\frac{1}{2}$
e. $6\frac{3}{4}+\frac{1}{4}$	*e.* $8\frac{3}{4}+1\frac{1}{4}$	*e.* $6\frac{3}{4}-\frac{1}{4}$

12. *a.* $5\frac{7}{8}+\frac{1}{8}$	**13.** *a.* $8\frac{1}{2}-\frac{1}{4}$	**14.** *a.* $53-29$
b. $6\frac{7}{8}+1\frac{1}{8}$	*b.* $9\frac{3}{4}-\frac{1}{2}$	*b.* $86-79$
c. $7\frac{1}{2}+\frac{1}{4}$	*c.* $8\frac{1}{2}+?=8\frac{3}{4}$	*c.* $65-38$
d. $8\frac{1}{2}+3\frac{1}{4}$	*d.* $5\frac{7}{8}+?=6$	*d.* $59+32$
e. $12\frac{1}{2}+7\frac{1}{2}$	*e.* $4\frac{3}{4}-?=4\frac{1}{2}$	*e.* $86+49$

The number written above the line in a fraction is the **numerator.**

The number written below the line in a fraction is the **denominator.**

Name the numerator and the denominator of $\frac{1}{2}$; $\frac{3}{4}$; $\frac{7}{8}$; $\frac{5}{6}$.

The *numerator* and *denominator* are called the **terms of a fraction.** Name the terms of $\frac{7}{8}$; $\frac{14}{15}$; $\frac{11}{13}$.

The numerator of a fraction is 5. The denominator is 9. What is the fraction? Write it.

What is the fraction whose numerator is 8 and whose denominator is 13? Write it.

A fraction always indicates division. The numerator is the *dividend.* The *denominator* is the *divisor.*

$\frac{18}{9} = 18 \div 9 = 2$; $\frac{17}{5} = 17 \div 5 = 3\frac{2}{5}$; $\frac{3}{4}$ inch = 3 inches $\div$ 4.

Draw a line 3 in. long. Divide it into 4 equal parts. Measure one part. How long is it?

Take 3 apples. Cut a quarter out of each one. Put together the 3 quarters cut out. What part of an apple do they make? How does this compare with the part that is left of each apple? The three apples have been divided into how many equal parts?

1. *Express as fractions:* $3 \div 8$; $7 \div 9$; $4 \div 5$; $15 \div 3$; $124 \div 17$.

2. $\frac{18}{9} = 2$; $\frac{18 \div 3}{9 \div 3} = ?$ $\frac{42}{14} = ?$ $\frac{42 \div 2}{14 \div 2} = ?$ $\frac{4}{8} = ?$ $\frac{4 \div 4}{8 \div 4} = ?$

3. Write the fraction whose terms are 3 and 5; 4 and 7; 5 and 8.

We have learned (Pages 195–6) that $\frac{4}{8}=\frac{1}{2}$; $\frac{3}{4}=\frac{6}{8}$; etc.

When we change $\frac{4}{8}$ to $\frac{1}{2}$, what do we do to the 4 to obtain 1? What do we do to the 8 to obtain 2? When we divide both 4 and 8 by 4 we do not change the *value* of the fraction.

We also may make the terms larger without changing the value of the fraction, as when we change $\frac{3}{4}$ to $\frac{6}{8}$.

A fraction, both of whose terms cannot be divided by the same number, is in its **lowest terms.**

Which of these are in lowest terms: $\frac{1}{2}$, $\frac{2}{3}$, $\frac{2}{4}$, $\frac{3}{6}$, $\frac{5}{8}$, $\frac{6}{9}$, $\frac{8}{10}$?

1. *Change* $\frac{4}{8}$ *to lowest terms:*

$$\frac{4}{8}=\frac{4\div 4}{8\div 4}=\frac{1}{2}.$$ *Answer.*

2. *Change* $\frac{4}{6}$ *to lowest terms:*

$$\frac{4}{6}=\frac{4\div 2}{6\div 2}=\ ?$$ *Answer.*

Change to lowest terms:

3. $\frac{3}{6}$ 4. $\frac{6}{8}$ 5. $\frac{2}{4}$ 6. $\frac{9}{12}$ 7. $\frac{4}{12}$ 8. $\frac{2}{8}$ 9. $\frac{6}{12}$

10. $\frac{7}{14}$ 11. $\frac{6}{9}$ 12. $\frac{8}{16}$ 13. $\frac{3}{12}$ 14. $\frac{5}{10}$ 15. $\frac{2}{10}$ 16. $\frac{6}{10}$

17. $\frac{8}{10}$ 18. $\frac{5}{15}$ 19. $\frac{3}{15}$ 20. $\frac{2}{14}$ 21. $\frac{12}{16}$ 22. $\frac{14}{16}$ 23. $\frac{15}{20}$

ADDITION

1. $\frac{3}{4}+\frac{1}{4}=\frac{4}{4}=1$; $\frac{6}{8}+\frac{2}{8}=\frac{?}{8}=?$ $\frac{4}{5}+\frac{1}{5}=\frac{?}{5}=?$
2. $\frac{3}{4}+\frac{2}{4}+\frac{3}{4}=\frac{8}{4}=2$; $\frac{2}{5}+\frac{1}{5}+\frac{2}{5}=\frac{?}{5}=?$
3. $\frac{2}{3}+\frac{1}{3}=?$ $\frac{4}{5}+\frac{1}{5}=?$ $\frac{3}{6}+\frac{2}{6}+\frac{1}{6}=?$ $\frac{7}{8}+\frac{1}{8}=?$
4. $2\frac{1}{2}+3\frac{1}{2}=5\frac{2}{2}=6$; $6\frac{1}{3}+8\frac{2}{3}=14\frac{3}{3}=?$
5. $3\frac{3}{4}+2\frac{1}{4}=?$ $4\frac{3}{8}+5\frac{5}{8}=?$ $6\frac{7}{8}+\frac{1}{8}=?$
6. $11\frac{2}{3}+\frac{1}{3}=?$ $9\frac{5}{6}+2\frac{1}{6}=?$ $7\frac{3}{5}+2\frac{2}{5}=?$

WHOLE AND MIXED NUMBERS

A number that has no fractional part is a **whole number.**

Thus, 5, 8, 10, 11, 15, are whole numbers.

A whole number and a fraction, taken together, make a **mixed number.**

Thus, $2\frac{1}{2}$, $7\frac{1}{3}$, $8\frac{3}{4}$, are mixed numbers.

A fraction whose numerator is larger than its denominator may be changed to a **whole** *or a* **mixed number** by dividing the numerator by the denominator. Thus, $\frac{6}{2}=3$, $\frac{7}{2}=3\frac{1}{2}$, $\frac{12}{3}=4$, $\frac{13}{5}=2\frac{3}{5}$.

Written.

NOTE. — *In the answer,* when the numerator of a fraction is equal to, or larger than, the denominator, always find the value of the fraction as a whole or a mixed number. Change the fraction part to lowest terms.

1. *Add:* $34\frac{1}{4}$, $42\frac{3}{4}$, 56; $132\frac{4}{4}=133$ *Sum.*

2. *Add:* $43\frac{3}{8}$, $58\frac{1}{8}$, $62\frac{7}{8}$; $163\frac{11}{8}=164\frac{3}{8}$ *Sum.*

3. $36\frac{1}{4}$, $41\frac{3}{4}$, 59	4. $39\frac{2}{3}$, $91\frac{2}{3}$, $85\frac{2}{3}$	5. $48\frac{5}{8}$, 62, $81\frac{3}{8}$	6. $96\frac{1}{2}$, $78\frac{1}{2}$, $82\frac{1}{2}$	7. $235\frac{4}{5}$, $342\frac{2}{5}$, 998
8. $345\frac{3}{4}$, $296\frac{1}{4}$, $408\frac{1}{4}$	9. $99\frac{7}{8}$, $12\frac{3}{8}$, $15\frac{5}{8}$	10. $83\frac{5}{6}$, $49\frac{1}{6}$, 87	11. $12\frac{1}{2}$, $19\frac{1}{2}$, 388	12. $892\frac{3}{4}$, $485\frac{3}{4}$, $207\frac{3}{4}$
13. $49\frac{7}{8}-26\frac{3}{8}$	14. $81\frac{3}{4}-25\frac{2}{4}$	15. $92\frac{2}{3}-86\frac{1}{3}$	16. $237\frac{1}{2}-195\frac{1}{2}$	17. $324\frac{4}{5}-197\frac{3}{5}$

NOTE. — Many of these exercises may be illustrated by means of objects and drawings.

1. Add $\frac{3}{4}$ and $\frac{1}{8}$.

$$\begin{array}{r} \frac{3}{4} = \frac{6}{8} \\ \frac{1}{8} = \frac{1}{8} \\ \hline \frac{7}{8} \textit{ Sum.} \end{array}$$

2. Add $\frac{3}{4}$ and $\frac{5}{8}$.

$$\begin{array}{r} \frac{3}{4} = \frac{6}{8} \\ \frac{5}{8} = \frac{5}{8} \\ \hline \frac{11}{8} = 1\frac{3}{8} \textit{ Sum.} \end{array}$$

3. Add $12\frac{3}{4}$ and $21\frac{3}{8}$.

$$\begin{array}{r} 12\frac{3}{4} = 12\frac{6}{8} \\ 21\frac{3}{8} = 21\frac{3}{8} \\ \hline 33\frac{9}{8} = 34\frac{1}{8} \textit{ Sum.} \end{array}$$

4. From $18\frac{1}{2}$ take $6\frac{1}{8}$.

$$\begin{array}{r} 18\frac{1}{2} = 18\frac{4}{8} \\ 6\frac{1}{8} = 6\frac{1}{8} \\ \hline 12\frac{3}{8} \textit{ Remainder.} \end{array}$$

5. Add $\frac{1}{4}$ and $\frac{1}{8}$.
6. Add $\frac{1}{4}$ and $\frac{3}{8}$.
7. Add $\frac{3}{4}$ and $\frac{7}{8}$.
8. Add $\frac{1}{2}$ and $\frac{3}{4}$.
9. From $\frac{7}{8}$ take $\frac{1}{2}$.
10. From $\frac{1}{2}$ take $\frac{1}{8}$.
11. From $\frac{7}{8}$ take $\frac{1}{4}$.
12. From $\frac{3}{4}$ take $\frac{3}{8}$.
13. From $\frac{7}{8}$ take $\frac{3}{4}$.
14. From $\frac{5}{8}$ take $\frac{1}{4}$.
15. $29\frac{3}{8} + 48\frac{1}{4}$.
16. $37\frac{1}{8} + 81\frac{1}{2}$.
17. $57\frac{3}{4} + 93\frac{3}{8}$.
18. $44\frac{5}{8} + 65\frac{1}{8}$.
19. $64\frac{1}{2} + 23\frac{7}{8}$.
20. $91\frac{7}{8} - 42\frac{1}{2}$.
21. $46\frac{5}{8} - 34\frac{1}{4}$.
22. $83\frac{7}{8} + 21\frac{1}{4}$.
23. $42\frac{3}{4} + 48\frac{1}{2}$.
24. $89\frac{1}{2} + 40\frac{3}{4}$.

25. Alice bought $9\frac{3}{4}$ yd. of silk and $4\frac{1}{4}$ yd. of muslin. How many yards did she buy?

I. *Express in figures:*

1. Four hundred six thousand twenty-nine.
2. Seven million thirty-nine.
3. XCVIII. 4. LXV. 5. XLIV.

II. *Express in Roman numerals:*

1. 36. 2. 75. 3. 99. 4. Fifty-three. 5. Ninety-one.

III. *Add,* testing results by adding in the opposite direction: (Five minutes?)

1.	2.	3.	4.
6384	$635.70	384	338
7168	90.89	98	75
997	378.44	8375	908
875	6.89	415	36
3098	93.75	793	804
984	5.66	687	75
76	98.37	487	88

IV. *Subtract,* testing results by addition:

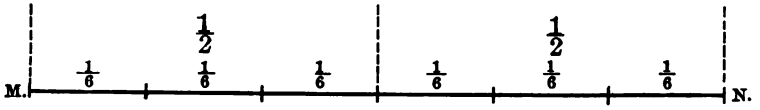
1.	2.	3.	4.
8305	6307	$348.56	37685
4796	598	97.67	16889

V. *Find the quotients,* testing your work by multiplication:

1. $\frac{37932}{87}$ 2. $\frac{58955}{65}$ 3. $\frac{30628}{38}$ 4. $\frac{77904}{24}$

VI. *Divide and test:*

1. $\frac{19008}{48}$ 2. $\frac{530816}{88}$ 3. $\frac{560400}{600}$ 4. $\frac{924040}{130}$



1. How many *halves* in the line MN?

2. How many *sixths* in the line MN?

3. How many sixths in $\frac{1}{2}$ of the line? $\frac{1}{2} = \frac{?}{6}$.

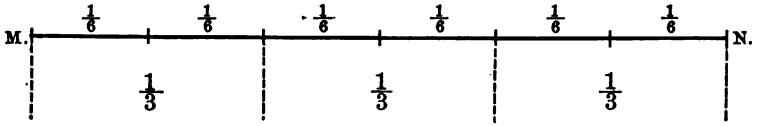
4. Find $\frac{1}{6}$ more than $\frac{1}{2}$ of the line. How many sixths of the line have you found? $\frac{1}{2}+\frac{1}{6}=\frac{3}{6}+\frac{1}{6}=\frac{4}{6}$.

5. Find $\frac{5}{6}$ of the line. $\frac{5}{6}$ of the line is how much more than $\frac{1}{2}$ of the line? $\frac{5}{6} - \frac{1}{2} = \frac{5}{6} - \frac{3}{6} = \frac{2}{6}$.

6. *When we wish to find the differences or sums of halves and sixths, we change the halves to what?*

7. Draw on the blackboard a picture of a pie cut into 6 pieces. Erase $\frac{1}{2}$ of it. How many halves are left? How many sixths are left? Add $\frac{2}{6}$ to the part that is left. What part have you? $\frac{3}{6} + \frac{2}{6} = ?$

8. $\frac{1}{2}+\frac{1}{6}=?$ $\frac{1}{2}+\frac{3}{6}=?$ $\frac{1}{2}+\frac{2}{6}=?$ $\frac{5}{6}-\frac{1}{2}=?$ $\frac{4}{6}-\frac{1}{2}=?$

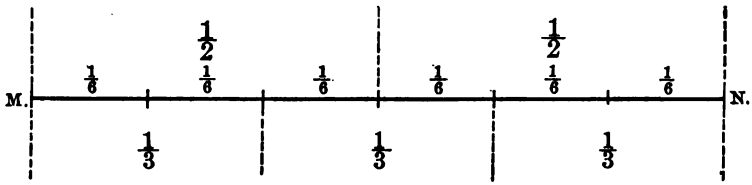


9. $\frac{1}{3}$ = how many 6ths? $\frac{2}{3}$ = how many 6ths?

10. Find $\frac{2}{3}$ and $\frac{1}{6}$ of the line. How many 6ths of the line have you found?

11. $\frac{1}{3} - \frac{1}{6} = \frac{2}{6} - \frac{1}{6} = \frac{1}{6}$; $\frac{1}{3} + \frac{3}{6} = \frac{2}{6} + \frac{3}{6} = \frac{5}{6}$.

12. $\frac{1}{3}+\frac{1}{6}=?$ $\frac{2}{3}+\frac{1}{6}=?$ $\frac{5}{6}-\frac{1}{3}=?$ $\frac{5}{6}-\frac{2}{3}=?$ $\frac{3}{6}-\frac{1}{3}=?$



1. By what part of the line MN can you measure both *thirds* and *halves?* $\frac{1}{3}$ = how many sixths? $\frac{1}{2}$ = how many sixths?

2. *To what shall we change halves and thirds when we wish to find their sums or differences?*

3. Find: $\frac{1}{2} + \frac{1}{3}$; $\frac{2}{3} + \frac{1}{2}$; $\frac{2}{3} - \frac{1}{2}$; $\frac{1}{2} - \frac{1}{3}$.

4. $6 \div 2 = ?$ $6 \div 3 = ?$ 6 is what of 2 and 3?

Add:

5.	6.	7.	8.	9.
$7\frac{1}{2}$	$3\frac{1}{3}$	$4\frac{1}{2}$	$8\frac{1}{2}$	$6\frac{2}{3}$
$2\frac{1}{6}$	$5\frac{1}{6}$	$5\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{6}$

Subtract:

10.	11.	12.	13.	14.
$2\frac{5}{6}$	$8\frac{4}{6}$	$9\frac{1}{2}$	$6\frac{2}{3}$	$18\frac{5}{6}$
$\frac{1}{2}$	$2\frac{1}{3}$	$2\frac{1}{3}$	$\frac{1}{2}$	$8\frac{1}{3}$

Written.

Find results:

1.	2.	3.	4.	5.
$4\frac{7}{8}$	$15\frac{3}{8}$	$4\frac{1}{2}$	$8\frac{5}{8}$	$47\frac{3}{4}$
$+ 8\frac{1}{4}$	$+ 7\frac{3}{4}$	$+ \frac{7}{8}$	$+ 2\frac{1}{2}$	$+ 16\frac{1}{2}$

6.	7.	8.	9.	10.
$13\frac{5}{8}$	$49\frac{3}{4}$	$99\frac{7}{8}$	$432\frac{1}{4}$	$467\frac{1}{2}$
$- 10\frac{1}{2}$	$- 16\frac{5}{8}$	$- 15\frac{1}{2}$	$- 129\frac{1}{8}$	$- 288\frac{3}{8}$

Add:

1. $18\frac{1}{2}$	2. $16\frac{1}{3}$	3. $23\frac{1}{6}$	4. $54\frac{1}{2}$	5. $35\frac{1}{2}$
$16\frac{1}{6}$	$19\frac{1}{6}$	$98\frac{2}{3}$	$16\frac{1}{3}$	$42\frac{1}{3}$
6. $17\frac{2}{3}$	7. $39\frac{1}{2}$	8. $72\frac{5}{6}$	9. $46\frac{1}{3}$	10. $83\frac{2}{3}$
$15\frac{5}{6}$	$89\frac{5}{6}$	$81\frac{1}{2}$	$89\frac{5}{6}$	$10\frac{1}{2}$
11. $24\frac{1}{2}$	12. $35\frac{1}{3}$	13. $41\frac{1}{2}$	14. $70\frac{5}{6}$	15. $63\frac{2}{3}$
$12\frac{1}{6}$	$19\frac{1}{6}$	$18\frac{1}{3}$	$18\frac{1}{2}$	$12\frac{1}{2}$
16. $39\frac{5}{6}$	17. $89\frac{2}{3}$	18. $30\frac{5}{6}$	19. $84\frac{1}{4}$	20. $97\frac{5}{8}$
$12\frac{2}{3}$	$29\frac{1}{2}$	$19\frac{1}{3}$	$19\frac{5}{8}$	$16\frac{3}{4}$

Find results:

21. $48\frac{1}{2}$	22. $57\frac{7}{8}$	23. $80\frac{3}{4}$	24. $483\frac{5}{6}$	25. $130\frac{5}{8}$
$-\ 16\frac{1}{4}$	$+\ 81\frac{3}{4}$	$-\ 21\frac{3}{8}$	$+\ 239\frac{2}{3}$	$-\ 21\frac{1}{2}$
26. $231\frac{2}{3}$	27. $437\frac{1}{8}$	28. $380\frac{7}{8}$	29. $42\frac{1}{2}$	30. $46\frac{2}{3}$
$+\ 498\frac{5}{6}$	$+\ 49\frac{3}{4}$	$-\ 18\frac{1}{2}$	$-\ 39\frac{1}{4}$	$+\ 85\frac{2}{3}$

Oral.

1. $9-\frac{1}{2}$.	2. $7-\frac{1}{3}$.	3. $6-\frac{1}{4}$.	4. $11-\frac{1}{8}$.
5. $14-\frac{2}{3}$.	6. $15-\frac{3}{4}$.	7. $12-\frac{3}{8}$.	8. $16-\frac{5}{8}$.
9. $12-2\frac{1}{2}$.	10. $14-3\frac{1}{3}$.	11. $15-3\frac{1}{6}$.	12. $18-1\frac{1}{4}$.
13. $6-2\frac{1}{8}$.	14. $5-1\frac{2}{3}$.	15. $8-5\frac{3}{8}$.	16. $9-2\frac{5}{8}$.
17. $7-1\frac{7}{8}$.	18. $12-3\frac{1}{7}$.	19. $14-8\frac{2}{7}$.	20. $12-11\frac{7}{8}$.

1. When steak costs 30 ¢ a pound, a half pound costs —— cents. $1\frac{1}{2}$ pounds cost 30 ¢ + 15 ¢ or —— cents. What would $2\frac{1}{2}$ pounds cost? $3\frac{1}{2}$ pounds?

2. When sugar is 8 cents a pound, $3\frac{1}{2}$ pounds cost $3\frac{1}{2}$ times 8 cents, or —— cents. ($3 \times 8 = 24$. $\frac{1}{2}$ of 8 = 4. 24 + 4 = ?)

3. What is the cost of $4\frac{1}{2}$ gal. of oil at 12 ¢ a gallon?

4. How many feet in 7 yd.? In $\frac{1}{3}$ yd.? In $7\frac{2}{3}$ yd.?

5. In 1 da. there are —— hr. In $\frac{3}{4}$ da. there are —— hr. In $1\frac{3}{4}$ da. there are —— hr.

Written:

1. How many hours are there in $9\frac{2}{3}$ days?

24	
$9\frac{2}{3}$	
16	hr. in $\frac{2}{3}$ da. ($\frac{2}{3}$ of 24 = 16)
216	hr. in 9 da.
232	hr. in $9\frac{2}{3}$ da. *Answer.*

2. Find how many hours in $21\frac{3}{4}$ days.

3. $32 \times 5\frac{3}{4}$	4. $21 \times 8\frac{2}{3}$	5. $485 \times 1\frac{1}{5}$	6. $485 \times 1\frac{2}{5}$	7. $485 \times 7\frac{4}{5}$
8. $252 \times 1\frac{1}{7}$	9. $252 \times 1\frac{3}{7}$	10. $252 \times 5\frac{3}{7}$	11. $84 \times 16\frac{1}{2}$	12. $24 \times 7\frac{5}{6}$
13. $205 \times 9\frac{4}{5}$	14. $336 \times 6\frac{4}{7}$	15. $485 \times 4\frac{2}{5}$	16. $204 \times 8\frac{1}{6}$	17. $136 \times 2\frac{3}{8}$

1. Give the factors of 6; 8; 9; 15; 21; 35.

2. Name the multiples of 7 to 84.

3. What three factors, multiplied together, will produce 30? 18? 40? 42?

4. Give four numbers that are factors of 12.

5. A conductor took up $1.00 in 5-cent fares. He collected from how many people?

6. 8 oz. is what part of 2 lb.?

7. $200 \div 10 = ?$ 8. $56 \times 10 = ?$ 9. $4300 \div 100 = ?$

10. 3 pk. 3 qt. are how many qt.?

11. What must be paid for $2\frac{1}{2}$ qt. of berries at 12 ¢ per quart?

12. Even numbers are multiples of what?

Written:

1. *Add up, then down. Time yourself:*

a.	*b.*	*c.*	*d.*
461	$32.15	9342	931
350	14.63	8675	49
98	2.75	4038	867
233	3.81	5216	423
57	54.29	7879	78
476	6.38	4632	961
92	7.93	184	28

2. 436×251. 3. 429×807. 4. 906×583.

5. 638×246. 6. 1132×406. 7. 9381×305.

8. Divide 4725 by 63 and test your work.

Oral.

1. Find the cost of $1\frac{1}{2}$ lb. of candy at 40¢ a pound.

2. Find the cost of $1\frac{1}{8}$ lb. of ginger at 32¢ a pound.

3. Five boys share equally 1 lb. 9 oz. of candy. How many ounces of candy are there? What is each boy's share?

4. 6 ft. + 2 ft. + 4 ft. = how many yards?

5. How many square inches in a rectangle 6 in. by $2\frac{1}{2}$ in.? In a rectangle 8 in. by $3\frac{3}{4}$ in.?

6. Leah bought $\frac{3}{4}$ yd. of muslin and used $\frac{3}{8}$ yd. for her doll. How much remained?

7. Wallace gave $\frac{1}{2}$ of his candy to Charles and $\frac{1}{3}$ of it to Harold. What part of his candy did he give away? What part did he keep?

Written:

1. At $1.55 a yard, what will 64 yd. of carpet cost?

2. Two boys skate in the same direction. One goes 65 yd., the other 3 times as far. How far apart are they? (Picture.)

3. How many feet in the perimeter of a floor 20 ft. by 15 ft.? (Picture.)

4. Hubert found $58\frac{7}{8}$ inches of rubber pipe and used $19\frac{1}{4}$ inches of it for his air pump. How much remained?

5. A pine tree measures $39\frac{7}{8}$ in. around. Five years ago, it measured $28\frac{3}{4}$ inches. How much has the measure increased?

6. What will it cost to resurface $28\frac{1}{4}$ miles of streets in Toledo, at $5280 a mile?

1. Harry took in at his soda fountain on Monday $6.37, on Tuesday $9.14, on Wednesday $6.84, on Thursday $9.25, on Friday $5.76, on Saturday $7.28. *a.* How much money did he take in during the week? *b.* Harry's best day was how much better than his poorest day?

2. A merchant bought a case of pencils containing 120 boxes, each box containing 6 dozen pencils. *a.* How many dozen were there? *b.* How many pencils were there?

3. $296\frac{1}{8}$	4. $99\frac{2}{3}$	5. $793\frac{5}{6}$	6. $308\frac{2}{3}$
$+ 549\frac{3}{4}$	$+ 81\frac{1}{2}$	$- 241\frac{1}{3}$	$- 209\frac{1}{2}$
7. $435\frac{3}{8}$	8. $895\frac{5}{8}$	9. $973\frac{2}{3}$	10. $43\frac{5}{6}$
$+ 79\frac{3}{4}$	$+ 408\frac{1}{2}$	$+ 46\frac{1}{2}$	$+ 98\frac{2}{3}$
11. $784\frac{7}{8}$	12. $46\frac{3}{4}$	13. $89\frac{5}{8}$	14. $201\frac{7}{8}$
$+ 91\frac{3}{4}$	$+ 78\frac{1}{2}$	$+ 43\frac{3}{4}$	$- 108\frac{1}{4}$

15. *Divide and test your work:* *a.* 17,745 by 35; *b.* 331,444 by 47; *c.* 476,834 by 95.

16. There are four people in a family. Each spends 50¢ a week for candy and moving pictures. How much do they all spend for these things in 20 weeks?

17. Find a number that is a multiple of 19, 23, and 41.

18. $65\frac{1}{2} - 14\frac{1}{3} = ?$ 19. $42\frac{2}{3} - 13\frac{1}{2} = ?$ 20. $84\frac{7}{8} - 23\frac{3}{4} = ?$

21. The ice froze $4\frac{1}{8}$ inches thick last week, and $5\frac{3}{4}$ inches more this week. *a.* How thick is it? *b.* If it should thaw $2\frac{1}{4}$ in., how thick would it then be?

Answer to yourself these questions about each problem: *a. What is told? b. What is asked? c. What must I find first?*

1. Horace traveled 37 miles and Joseph five times as far. How far did Joseph travel? (Picture.)

2. A man born in 1812 died in 1890. How old was he?

3. Mrs. Yates bought some coffee for 48 cents, some sugar for 65 cents, and some eggs for 88 cents. She gave the clerk a $5 bill. How much change should he give her?

(Problems 4–10 are for strong pupils.)

4. Mrs. French bought 38 yards of carpet, and took back a piece 54 feet long. How many yards did she keep?

5. 8 arithmetics cost $4.48. What will 16 arithmetics cost? (Two ways.)

6. A man earns $20 a week and saves $\frac{1}{5}$ of it. How long will it take him to save $96?

7. A farmer sold some butter for $47.85, some eggs for $5.38, some hams for $11.57, and some apples for $13.50. He put $53.89 in the bank and kept the remainder of the money. How much money did he keep?

8. Ted had 49 marbles and Ned had four times as many. How many had both?

9. A man earned $392 and used $\frac{3}{7}$ of it. *a.* How much did he use? *b.* How much had he left?

10. Elizabeth bought $1\frac{1}{2}$ dozen bananas at 30¢ a dozen for the class picnic. What did they cost?

PROBLEMS OF THE HOME

1. Helen's mother made Helen a winter coat. The materials cost as follows: $2\frac{7}{8}$ yd. cheviot, \$7.90; $\frac{1}{2}$ yd. velveteen, 50 cents; $\frac{1}{2}$ yd. sateen, 15 cents; 1 spool of silk, 10 cents; 1 spool of twist, 5 cents; 1 spool of basting thread, 5 cents; 1 pattern, 15 cents; 9 buttons, 30 cents; crinoline, 5 cents. What did all of the materials cost?

2. If bought at a store, this coat would have cost \$20. How much did Helen's mother save by making the coat?

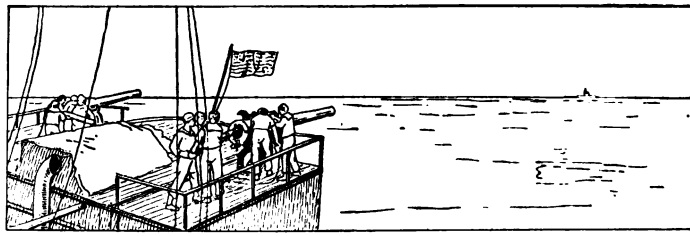
3. The cheviot had been selling at \$4.50 a yard, but Helen's mother bought it at a sale for \$2.75 a yard. How much per yard did she save?

4. Christopher's father bought eight cords of wood at \$6.50 a cord. He paid Christopher 75 cents a cord for sawing it. What did the wood cost, including the sawing?

5. Margaret's mother has been paying \$3.00 per week for having the family laundry work done at the steam laundry. How much per week will she save by having it done at home for \$1.75?

6. Mrs. Johnson makes 39 loaves of bread from one sack of flour. How much would this bread cost if bought at the store at ten cents a loaf?

7. A sack of flour costs \$1.75. If the bread from this flour is sold for \$3.90, how much more is received for the bread than is paid for the flour?



1. The gunner on this merchant vessel has fired a shot at the U-boat, 350 yards away. How many feet apart are the ships?

2. The U-boat weighs 600 tons and the merchant vessel weighs 9600 tons. The merchant vessel is how many times as heavy as the U-boat?

3. The U-boat cost $450,000 and the merchant vessel cost $3,150,000. The merchant vessel was how many times as expensive as the U-boat?

4. Five boys planted gardens on a vacant lot that was 150 ft. long and 50 ft. wide. Make a drawing of the lot, using 1 inch for 25 feet. Divide it into 5 equal parts, and find out how many square feet each part contains.

5. Mr. Jensen, the grocer, could have bought flour at $6.45 a barrel on Monday. He waited until Friday and the price had risen to $7.20 a barrel. How much more did 75 barrels cost on Friday than it would have cost on Monday?

6. (For strong pupils.) For 10 years Mr. Smedley has saved $200 a year from his salary. He has received interest amounting to $\frac{1}{5}$ of his savings. How much interest has he received?

Oral:

1. On Saturday, Genevieve made $\frac{3}{4}$ yd. of tatting, and Edith made $\frac{5}{8}$ of a yard. Which made the longer piece, and how much longer was it?

2. Which is greater, $\frac{3}{4}$ of a dollar or $\frac{7}{8}$ of a dollar? How much greater?

3. Frank set out 24 tomato plants that cost him 30¢ a dozen. How much did they all cost?

4. Frank sold 100 lb. of tomatoes at 4¢ a pound. How much did he receive for them?

5. Three 5-cent packages of firecrackers and one 10-cent package cost how much?

Written:

1. 100 lb. of peanuts were put into bags, $\frac{1}{4}$ lb. being put into each bag. How many bags were used, and how much was received for the peanuts at 5¢ a bag?

2. Kate had \$8.52 in the school bank, Jan. 1. She deposited \$.76 in January, \$1.23 in February, and \$5.18 during the rest of the year. She drew out \$2.25. How much had she in the bank at the end of the year?

3. In 1914 a merchant sold flour at \$1.38 a sack. In 1918 he sold the same kind of flour for \$3.35 a sack. What was the increase in price?

4. Mr. Arnold earned \$2.40 a day in 1914 and \$5.85 a day in 1918. *a.* How much per day did his wages increase? *b.* How much more per week did he receive?

5. If 12¢ worth of food is wasted every day in Mrs. Ackley's kitchen, what is the amount of waste in a year?

Oral:

1. Before we find the sums or differences of fourths and halves, we change the halves to ——.

2. Before we find the sums or differences of fourths and eighths, we change the fourths to ——.

3. Before we find the sums or differences of halves and eighths or fourths and eighths, we change the halves and fourths to ——. 8 is a —— of 2 and 4.

4. Before we find the sums or differences of halves and thirds, we change the halves and thirds to ——.

5. Before we find the sums or differences of halves and sixths, we change halves to ——. 6 is a —— of 2.

6. Before we add halves, thirds, and sixths, we change the halves and thirds to ——. 6 is a multiple of ——, ——, and ——.

SHORT WRITTEN TESTS

I. *Add, and test by adding in the opposite direction.*

Do not copy addends. Can you get five correct answers in 7 minutes?

1.	2.	3.	4.	5.
3865	$79.85	2487	$ 9.84	621
4978	59.50	76	3.79	937
7308	8.37	421	42.73	2371
6234	9.42	8354	193.25	765
796	14.87	987	86.39	87
4931	13.93	63	741.83	9824
9734	9.71	425	39.99	534

II. 1. $\$380.59 + ? = \$470.28$. 2. $? + \$165.20 = \$823.19$.

3. $35\frac{1}{3} + 48\frac{1}{6} = ?$ 4. $24\frac{1}{6} + ? = 45\frac{1}{3}$.

1. From the sum of $4\frac{3}{8}$ and $6\frac{1}{4}$ take the sum of $2\frac{1}{8}$ and $3\frac{1}{4}$.

2. Ben rode his wheel $5\frac{2}{3}$ miles on Monday and $6\frac{1}{2}$ miles on Tuesday. How many miles did he ride in the two days?

3. In a sugar camp, the maple sugar is made into pound cakes. How many pounds of sugar are there in 17 boxes, each containing 240 of these cakes?

4. A collector received $\$2\frac{3}{4}$ at one house, \$5 at another, $\$6\frac{1}{2}$ at another, and $\$8\frac{1}{2}$ at another. How much did he receive?

5. Find the value of $\frac{298}{7}$; $\frac{4632}{11}$; $\frac{8972}{13}$; $\frac{1728}{23}$.

6. Find the cost:

a. Of 35 sacks of potatoes at \$1.15 a sack.

b. Of 19 boxes of apples at \$1.25 a box.

c. Of 15 boxes of peaches at 65 cents a box.

d. Of all three of the above items.

7. Eugene ran $26\frac{5}{8}$ rods while Charles ran $25\frac{1}{2}$ rods. Which was ahead and how much, if they started together?

8. How many days will a 125 lb. sack of potatoes last our family, if we use 5 lb. a day?

9. What does a year's rent amount to at \$23 a month?

10. Mr. Brown spends 50¢ a day for cigars. How much do his cigars cost during one leap year?

Find the quotients and remainders:

1. 48,759 ÷ 61.
2. 67,300 ÷ 99.
3. 398,594 ÷ 13.
4. 937,642 ÷ 86.
5. 869,324 ÷ 88.
6. 460,307 ÷ 76.
7. 306,952 ÷ 64.
8. 301,875 ÷ 61.
9. 739,449 ÷ 81.
10. 4,169 ÷ 28.
11. 295,731 ÷ 81.
12. 635,364 ÷ 74.
13. 258,184 ÷ 59.
14. 47,698 ÷ 15.
15. 896,710 ÷ 95.
16. 706,053 ÷ 83.
17. 320,598 ÷ 43.
18. 835,104 ÷ 79.
19. 193,742 ÷ 84.
20. 212,652 ÷ 36.
21. 39,168 ÷ 96.
22. 84,526 ÷ 24.
23. 93,075 ÷ 42.
24. 238,905 ÷ 45.
25. 408,867 ÷ 51.
26. 363,909 ÷ 93.
27. 467,358 ÷ 72.
28. 89,346 ÷ 85.
29. 29,376 ÷ 99.
30. 630,798 ÷ 37.
31. 291,306 ÷ 73.
32. 600,735 ÷ 29.
33. 380,708 ÷ 48.
34. 783,092 ÷ 38.
35. 282,532 ÷ 92.
36. 151,658 ÷ 38.
37. 360,668 ÷ 44.
38. 258,285 ÷ 67.
39. 623,696 ÷ 68.
40. 222,432 ÷ 56.
41. 79,364 ÷ 14.
42. 376,983 ÷ 33.
43. 99,090 ÷ 87.
44. 63,758 ÷ 23.
45. 61,234 ÷ 21.
46. 305,168 ÷ 27.
47. 176,858 ÷ 22.
48. 326,529 ÷ 63.
49. 109,928 ÷ 91.
50. 88,765 ÷ 26.
51. 250,432 ÷ 52.
52. 266,818 ÷ 71.
53. 70,668 ÷ 78.
54. 963,174 ÷ 66.
55. 27,867 ÷ 19.
56. 80,093 ÷ 28.
57. 863,075 ÷ 25.
58. 637,808 ÷ 92.
59. 836,590 ÷ 97.
60. 706,893 ÷ 55.
61. 237,605 ÷ 47.
62. 608,025 ÷ 75.
63. 111,622 ÷ 98.
64. 816,592 ÷ 92.
65. 149,888 ÷ 16.
66. 78,768 ÷ 18.
67. 394,450 ÷ 46.
68. 983,746 ÷ 31.
69. 960,074 ÷ 35.
70. 403,798 ÷ 17.
71. 802,317 ÷ 89.
72. 340,781 ÷ 94.
73. 413,092 ÷ 32.
74. 53,781 ÷ 39.
75. 402,535 ÷ 49.
76. 698,001 ÷ 71.
77. 350,612 ÷ 58.
78. 496,682 ÷ 62.
79. 387,940 ÷ 54.
80. 127,104 ÷ 32.
81. 43,078 ÷ 57.

1. $\frac{1}{2}$ pk. + $\frac{1}{8}$ pk. is how many quarts?

2. Which is greater, $\frac{7}{8}$ of a foot or $\frac{3}{4}$ of a foot, and how much greater is it?

3. Which is greater and how much greater, $\frac{5}{8}$ of a day or $\frac{2}{3}$ of a day?

4. A milkman sold a customer 5 quart tickets and 8 pint tickets. How many quarts of milk must he give for all the tickets? How much is the milk worth at 10 cents a quart?

5. When 2 lb. of sugar are sold for 15 cents, what must be paid for 8 lb.? 8 lb. is how many times 2 lb.?

Written:

1. Ned counted 28 automobiles passing his house in $\frac{1}{4}$ of an hour. At that rate, how many would pass in 12 hours?

2. \$8820 was divided equally among 84 Indians. How much money did each receive?

3. 18 boys received 38 cents each for distributing hand-bills on Saturday. How much did they all receive?

4. Multiply the difference between 6008 and 2119 by 69.

5. John earned \$2$\frac{1}{2}$, William \$1$\frac{3}{4}$, and Henry \$5$\frac{3}{4}$. How much did all earn?

6. Sam drove a $\frac{7}{8}$-inch brad through a $\frac{1}{4}$-inch board into another board. How far into the second did it reach?

7. The four sides of a field are 33$\frac{1}{2}$ rods, 16$\frac{3}{4}$ rods, 38$\frac{5}{8}$ rods, and 41 rods. How many rods of fence will inclose the field?

1. Here are how many pies? Take away 2 pies. How many are left? If you take away $2\frac{1}{2}$ pies, what must you do to one of the pies? Make a picture of the $2\frac{1}{2}$ pies that you take away. Make a picture of the pies that are left. 5 pies less $3\frac{1}{2}$ pies are how many pies? 5 apples less $3\frac{1}{2}$ apples = ?

2. Make a picture of 5 pies less $1\frac{1}{2}$ pies; 5 pies less $1\frac{3}{4}$ pies; 9 pies less $3\frac{1}{3}$ pies; 4 pies less $1\frac{1}{8}$ pies; 5 pies less $2\frac{3}{8}$ pies.

3. From 5 take $2\frac{7}{8}$.

$$\begin{array}{r} 5 = 4\frac{8}{8} \\ 2\frac{7}{8} = 2\frac{7}{8} \\ \hline 2\frac{1}{8} \quad \textit{Remainder.} \end{array}$$

4. $83 - 17\frac{1}{2}$	5. $48 - 19\frac{1}{4}$	6. $631 - 29\frac{3}{4}$	7. $7 - 2\frac{3}{8}$	8. $431 - 231\frac{1}{5}$
9. $423 - 192\frac{1}{3}$	10. $69 - 58\frac{5}{6}$	11. $29 - 9\frac{3}{7}$	12. $401 - 300\frac{2}{3}$	13. $43 - 18\frac{3}{5}$
14. $61 - \frac{4}{18}$	15. $46 - 1\frac{5}{8}$	16. $28 - 14\frac{7}{10}$	17. $13 - 5\frac{5}{11}$	18. $16 - 15\frac{19}{20}$
19. $1 - \frac{17}{21}$	20. $61 - 15\frac{3}{7}$	21. $832 - 731\frac{23}{24}$	22. $39 - 8\frac{7}{9}$	23. $487 - 486\frac{9}{13}$

1. How many pounds are there in 5 tons of coal?

2. A man bought a wheelbarrow for $3.75 and paid for it with a $5 bill. What change should he receive?

3. Minnie had $5 and gave $1\frac{3}{4}$ to her sister. How many dollars had she left?

4. $15\frac{1}{3}$ barrels of water were drawn out of a cistern containing $19\frac{1}{2}$ barrels. How many barrels were left?

5. A boy was four feet tall on his ninth birthday. He had grown $1\frac{3}{4}$ inches in a year. How many inches tall was he on his eighth birthday?

Written:

1. Write in words: 410,004; 203,416; 3,000,015.

2. Express in figures: seven hundred six thousand twenty-nine.

3. Write in Roman, 51. Write in figures, XCV.

4. Add $10.06, $15.72, $60.87, $1.59, $3.45.

Add:

5.	6.	7.	8.	9.	10.	11.
63	87	42	96	54	83	28
59	64	35	42	96	73	18
17	65	49	28	16	94	31
64	82	39	50	26	45	17
23	72	18	25	16	25	29
36	28	65	32	44	46	38

Multiply:

12.	13.	14.	15.	16.	17.
896	897	598	384	999	894
94	63	76	65	106	200

Written:

1. A candy maker sold 856 pounds of chocolates at \$.21 a pound. How much did he receive?

856 \$.21 856 1712 \$179.76	He received as many cents as the product of 856 and 21, or 17976 cents, which equals \$179.76, *Answer.*

2. 2308 bags of oats at \$1.38 a bag cost how much?

2308 \$1.38 18464 6924 2308 \$3185.04	\$1.38 = 138 cents. 2308 bags of oats, at 138 cents a bag, cost as many cents as the product of 138 and 2308, or 318,504 cents, which equals \$3185.04, *Answer.*

3. \$4.75 earned per day is how much per week?

\$4.75 6 \$28.50	\$4.75 is 475 cents. 475 cents per day is as many cents per week as the product of 475 and 6, or 2850 cents, which equals \$28.50.

NOTE.— From the above examples, it is seen that when either the multiplicand or the multiplier contains cents, the product also contains cents. We may use either factor for the multiplier, pointing off two places, for cents, in the product.

Make problems and multiply:

4.	5.	6.	7.	8.
\$4.15 39	247 \$.05	\$9.36 42	3456 \$.98	438 \$.25

We have learned that —— cents make one dime and that —— dimes make one dollar.

The smallest piece of money used in our country is the cent, but in making calculations we sometimes have to speak of smaller amounts than one cent.

One tenth of a cent is called a **mill.**

$\frac{3}{10}$ of a cent are three mills; $\frac{7}{10}$ of a cent are seven mills, etc. $\frac{5}{10}$ of a cent are how many mills? What part of a cent are 9 mills? Since a mill is $\frac{1}{10}$ of a cent, —— mills make one cent.

A ten-dollar gold piece is called an **eagle.**

TABLE OF UNITED STATES MONEY

10 mills make 1 cent.
10 cents make 1 dime.
10 dimes make 1 dollar.
10 dollars make 1 eagle.

1. A 5-cent piece is what part of a dime?
2. A dime is what part of a dollar?
3. A 50-cent piece is how many dimes?
4. A 25-cent piece is how many dimes?
5. How many 25-cent pieces are worth as much as a silver dollar?
6. Express $\$2\frac{1}{4}$ as dollars and cents.
7. Express $4\frac{1}{2}$ dimes as cents.
8. A half dime, 2 dimes, a quarter, and a 50-cent piece are how many cents? How many dollars?

Find the sums, timing yourself:

1.	2.	3.	4.
$41.36	$34.63	$12.98	$46.89
52.81	8.47	6.32	4.37
8.46	92.45	4.28	90.19
79.38	3.06	7.91	7.81
8.92	93.57	5.16	6.29
4.05	.69	70.80	4.38

5. *Find what I must pay for all of these articles:*

5 boxes of note paper at	$.25 per box.
5 dozen tablets at	.50 per dozen.
12 paper weights at	.19 apiece.
7 ink wells at	.29 apiece.
3 bottles of mucilage at	.05 per bottle.
1 pair of scissors at	.62 per pair.

(Problems 6–8 are for the strong pupils.)

6. Mr. Taylor went to Boston. His railroad fare was $8.22 each way. He paid a hotel bill of $3.50 per day for 6 days. His other expenses were $7. If he started with $50, how much had he left?

7. A man worked a week for $3.75 per day. How much more did he earn than enough to buy a coat for $9.75, a pair of shoes for $4.90, and a hat for $2.00?

8. Twenty boys were given the use of a piece of land 320 feet long and 80 feet wide, for a war garden. How many square feet of land did each boy have if it was divided into equal parts? Make a drawing of the gardens, using 1 inch for 40 feet.

1. Frank's mother made 4 pies. They were cut into quarters, and to each of seven boys was given a quarter. How many pies were left? (Picture.)

2. Susan found 7 apples under the pippin tree. After she had given away 4 apples and had eaten $\frac{3}{8}$ of an apple, how many were left?

3. Name four multiples of 12.

4. Give three factors of 20; four factors of 16.

5. Name three numbers that will exactly divide 28.

6. Name three numbers that will exactly contain 5.

Written:

1. From the sum of \$12.15 and \$16.48 subtract the sum of \$10.18 and \$9.50.

2. Add six hundred four thousand, five hundred eight to ninety-four thousand fifty-six, and from the sum subtract five hundred six thousand ten.

3. A farmer had 25 acres of corn which yielded 55 bushels per acre. *a.* How many bushels of corn did the farmer have? *b.* How many pounds did the corn weigh if a bushel weighed 56 pounds?

4. *a.* Find the cost of 5 chickens at 77 cents apiece and 8 ducks at 82 cents each.

b. How much more do the ducks cost than the chickens?

5. Mr. McHenry burned 500 lb. of coal in his furnace in a week. What did it cost at \$8.50 a ton?

TABLE OF LIQUID MEASURE	
2 pints (pt.)	**make 1 quart (qt.)**
4 quarts	**make 1 gallon (gal.)**

One fourth of a pint is a **gill.** It is sometimes used in measuring small quantities of liquids. A common teacup holds a little less than two gills.

1. There are how many pints in a gallon?
2. There are how many gills in a gallon?
3. Three quarts are what part of a gallon?
4. Seven pints are what part of a gallon?

Written.

1. A milkman sold 19 gal. of cream in bottles, each holding 1 pint. How many bottles of cream did he sell?

2. One customer bought 2 gal. 1 qt. of milk, another 7 qt., and another 20 pint bottles. How many quarts of milk did they all buy?

3. How many gallons and quarts of vinegar are needed for 138 cans of pickles, using 1 pt. of vinegar for each can?

4. Change 17 gal. 3 qt. to quarts.

5. Change 51 gal. 1 pt. to pints.

6. Change 432 gal. to pints.

7. Change to gallons: *a.* 128 qt.; *b.* 112 pt.

8. How many days will 35 gal. of oil last an engineer who uses 1 pint every day?

1. When a gallon of molasses is worth 88 cents, what is a pint worth? Two quarts?

2. At 40¢ a dozen what must be paid for 18 eggs?

3. If 6 plums cost a cent, how many can be bought for 12 cents?

4. $1\frac{1}{2}$ lb. of beefsteak costs how much at \$.30 a lb.?

5. How many dollars must be paid for 16 spelling books at $\$\frac{1}{4}$ apiece?

6. What is the smallest number that contains the factors 3, 2, and 5? 2, 3, and 4? 5, 4, and 2?

Written.

1. Four girls bought 10 yd. of pink ribbon with which to tie Christmas gifts. Fay used $2\frac{1}{4}$ yd., Sue $3\frac{3}{8}$ yd., and Alice $1\frac{1}{2}$ yd. How much was left for Annette?

2. Irene bought a handkerchief for $\$\frac{3}{4}$, bead trimming for $\$\frac{3}{4}$, and a sailor hat for \$1. What change did she receive for a \$5 bill?

Perform the operation indicated in Examples 3–6.

3. $\frac{3878}{39}$ 4. $\frac{11704}{56}$ 5. $\frac{8832}{29}$ 6. $\frac{14847}{49}$

Add:

7.	8.	9.	10.	11.
$2\frac{1}{2}$	$3\frac{1}{3}$	$92\frac{3}{4}$	$46\frac{1}{3}$	$48\frac{3}{4}$
$\frac{3}{8}$	$2\frac{5}{6}$	$42\frac{1}{2}$	$79\frac{2}{3}$	$32\frac{1}{8}$
$5\frac{3}{4}$	$7\frac{1}{6}$	$79\frac{5}{8}$	$48\frac{1}{2}$	$66\frac{3}{8}$
$2\frac{7}{8}$	$8\frac{1}{2}$	$64\frac{7}{8}$	$80\frac{5}{6}$	$99\frac{1}{2}$

Subtract and test your work:

12.	13.	14.	15.	16.
$39\frac{1}{3}$	$40\frac{1}{3}$	$98\frac{3}{4}$	$78\frac{1}{2}$	$435\frac{1}{4}$
$19\frac{1}{6}$	$36\frac{1}{6}$	$21\frac{3}{8}$	$29\frac{1}{3}$	$241\frac{1}{8}$

TABLE OF DRY MEASURE	
2 pints (pt.)	**make 1 quart (qt.)**
8 quarts	**make 1 peck (pk.)**
4 pecks	**make 1 bushel (bu.)**

NOTE. 1. — One quart, dry measure, is equal to nearly $1\frac{1}{6}$ quarts, liquid measure.

NOTE 2. — Dry measure is used less than formerly, since weight is generally more accurate and just, in buying and selling. In the western part of our country, dry measure is seldom used for any purpose. Little time should be spent in drill on this table.

1. 1 bu. = —— pk. = —— qt. = —— pt.
2. How many quarts are there in 1 bu.? In $\frac{1}{8}$ bu.?
3. Seed corn at 5¢ a pint is how much a quart?

Written.

1. If Mr. Davis feeds his horse 1 pk. of oats every day, how many pecks will he use in 1 year? How many bushels?

(Questions 2–4 are for strong pupils.)

2. If 9 bu. of sweet potatoes cost $12.15, what will 1 peck cost at the same rate?
3. If my horse eats 6 quarts of oats a day, how many days will 12 bushels of oats last him?
4. Dennis and Bernard sold 2 bu. of peanuts at the ball game. They received 5¢ a half pint. (*a*) How much did they take in? (*b*) The peanuts cost them $2.60 a bushel and they paid 50¢ for paper bags. How much did they pay out? (*c*) How much did they make?

TABLE OF TIME	
60 seconds (sec.)	**make 1 minute (min.)**
60 minutes	**make 1 hour (hr.)**
24 hours	**make 1 day (da.)**
7 days	**make 1 week (wk.)**
12 months (mo.)	**make 1 year (yr.)**

Learn:

Thirty days have September,
April, June, and November.
All the rest have thirty-one
Save February, which alone has twenty-eight,
One year in four has twenty-nine.

1. Name the months that have 30 days.

2. Name the months that have 31 days.

3. How many days has February in leap year?

4. Write the names of the months, in order, with the number of days in each. Which long months are not separated by short months?

5. If you sleep eight hours every night, what part of all the time do you spend in sleep?

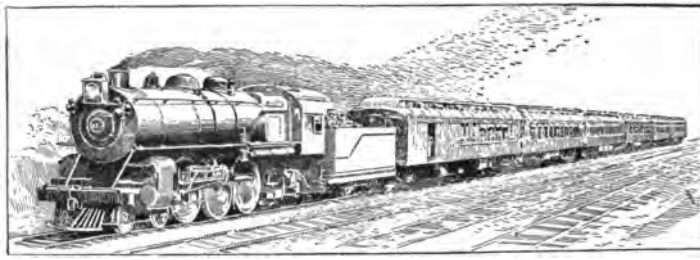
6. A man who works eight hours a day works what part of the day?

7. If you spend six hours a day at school, what part of the entire day do you have for other purposes?

8. How far will an aëroplane fly in $1\frac{1}{2}$ hours, if it flies at the rate of a mile a minute?

9. A boy who wastes 15 minutes every day wastes how many hours in the month of June?

10. Mr. Edmunds drove his car 123 miles a day during August. How many miles did he drive?



1. This train is called the "Broadway Limited." It runs from New York to Chicago, a distance of 907 miles, in 20 hours.

a. That is an average rate of how many miles an hour?

b. What part of a day is required for the trip?

c. How many minutes are required for the trip?

d. If the 6 cars are each 73 feet long and the locomotive and tender together are 58 ft. long, how long is the train?

2. From New York to Philadelphia is 92 miles, and from Philadelphia to Pittsburgh, 338 miles. How far is Pittsburgh from Chicago?

3. At times, this train runs at the rate of 70 miles per hour. That is how far per minute?

4. At 45 miles per hour, from 6 A.M. till 6 P.M., how far will a train run?

5. The regular fare between New York and Chicago is $21.10. On this train the fare is $8 more. What was Mr. Dunham's change from two $20 bills which he gave in payment for a ticket from New York to Chicago on this train?

TABLE OF AVOIRDUPOIS WEIGHT
16 ounces (oz.) make 1 pound (lb.)
2000 pounds make 1 ton (T.)

NOTE. — 100 lb. is sometimes called a hundredweight (cwt.). How many hundredweight make a ton?

1. A quarter of a pound of ginger is how many ounces?

2. A quarter of a ton of coal is how many pounds?

3. When a miller sells feed at $40 a ton, he receives how much per hundredweight?

4. During one month, a druggist sold eighty 8-ounce packages of bird seed. How many pounds of bird seed did he sell?

(How many packages make a pound?)

5. When a ton of coal costs $8, what will 5 cwt. of coal cost?

Written.

1. Seven people were taken in an elevator car to the 15th floor of an office building. Their weights were 215 lb., 124 lb., 173 lb., 205 lb., 132 lb., 89 lb., and 159 lb. How much less than a ton did the car carry?

2. There are 80 pieces of baggage in a baggage car. Their average weight is 75 lb. How many tons do they weigh?

3. A wagon-load of coal weighs three tons. It is in bags containing 100 pounds each. How many bags of coal are there?

4. How many 4-ounce bags can I fill from a box containing $7\frac{1}{2}$ lb. of candy?

Oral.

1. Harry has $\frac{3}{4}$ of a dollar. How much more money must he obtain before he can buy a $2 sled?

2. If a clock pendulum swings twice every second, how many times will it swing in an hour?

3. An hour's time schedule for a street car that passes a corner every 15 minutes, beginning at 5 o'clock, is 5.00, 5.15, 5.30, 5.45, 6.00. Give a 10-minute schedule for this car from 6 to 7 o'clock. Give a six-minute schedule from 7 to 8 o'clock.

4. On a 5-minute schedule, how many cars will pass in 1 hour?

5. If a newsboy sells one paper every minute during the rush time, how many papers will he sell in $\frac{3}{4}$ of an hour?

Written.

Add:

1.	2.	3.	4.	5.
$6\frac{1}{2}$	$16\frac{5}{8}$	$13\frac{1}{4}$	$8\frac{1}{2}$	$91\frac{3}{4}$
$7\frac{1}{4}$	$15\frac{1}{2}$	$19\frac{1}{2}$	$3\frac{1}{3}$	$14\frac{7}{8}$
$16\frac{1}{8}$	$7\frac{1}{8}$	$15\frac{7}{8}$	$2\frac{5}{6}$	$8\frac{1}{2}$

6. A garden $75\frac{3}{4}$ ft. long and $42\frac{1}{2}$ ft. wide will require how many feet of fence to inclose it?

7. A salary of $1296 a year is how many dollars a month?

8. March, April, and May are the spring months. September, October, and November are the fall months. Which is the longer season, and how many hours longer?

THE TABLE OF LINEAR MEASURE

12 inches (in.) make 1 foot
3 feet (ft.) make 1 yard
$5\frac{1}{2}$ yards (yd.) or $16\frac{1}{2}$ feet make 1 rod
320 rods (rd.) make 1 mile (mi.)

1. The longest boards commonly used for floors, siding, etc., are 16 feet long. They are how much less than a rod long? They are how many yards and feet long?

2. Measure a rod on the floor with a foot rule, and then with a yardstick. Draw on the blackboard a line that you think is 1 rod long. Measure and correct it. Estimate and measure various distances, as the length and breadth of the school lot, the distance to the nearest corner, etc.

3. A building lot 3 rods wide is how many feet wide? A city lot 4 rods wide is how many feet wide?

4. A city lot 8 rods long is how many feet long?

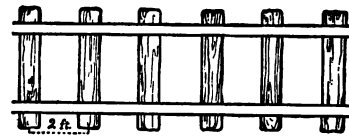
5. Knowing that $5\frac{1}{2}$ yd. make 1 rod, how could you show that $16\frac{1}{2}$ feet make one rod?

6. A short city block is about 20 rd. long. How many such blocks would make a mile? If the blocks were twice as long, how many would make 1 mile?

7. How many feet of molding will make a picture frame 36 in. by 24 in.? Make a drawing.

1. Find the number of feet in 1 mile.

2. How many ties are needed for a mile of railroad track, if they are laid two feet apart, from center to center?



3. A field is a rectangle 44 rods by 68 rods. How many rods of fence are needed to inclose it? (Picture.)

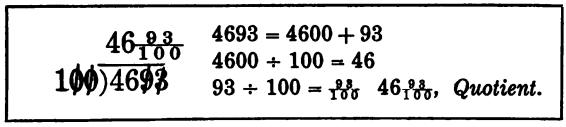
4. How many yards of rubber matting are needed to reach the length of a corridor that is 87 ft. long?

5. Farmers often estimate the length and breadth of a field by pacing across it. Mr. Hart has learned to take five paces for a rod of distance. If he finds this field to be 145 paces long and 105 paces wide, how many rods long and wide is the field? How many square rods does it contain?

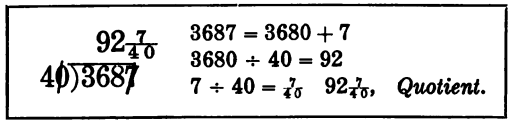
6. A race track, shaped like a zero, is 80 rods around. *a*. How many times must a runner go around the track to run a mile? *b*. How many miles will he run in going around 32 times?

7. Twelve boys went to a fire and were 15 minutes late at school. How many minutes were lost? How many hours were lost?

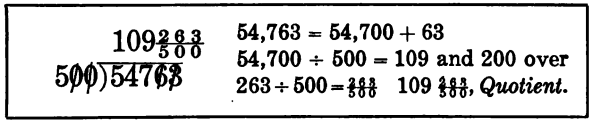
1. Divide 4693 by 100.



2. Divide 3687 by 40.



3. Divide 54,763 by 500.



4. 149 ÷ 10. **5.** 3462 ÷ 10. **6.** 84,763 ÷ 1000.

7. 5638 ÷ 1000. **8.** 2420 ÷ 20. **9.** 3742 ÷ 200.

10. 9747 ÷ 50. **11.** 98,924 ÷ 40. **12.** 6807 ÷ 340.

13. 947,612 ÷ 3000. **14.** 29,305 ÷ 600. **15.** 6350 ÷ 50.

16. 98,370 ÷ 90. **17.** 73,462 ÷ 90. **18.** 742,491 ÷ 6000.

19. $\frac{14030}{46}$ **20.** $\frac{17464}{74}$ **21.** $\frac{79808}{58}$ **22.** $\frac{162400}{35}$

23. In examples 19 to 22, tell which numbers are products and which are factors. When a product and one of its two factors are given, how may the other factor be found? 70,196 = 92 × ?

24. A rifle range is 625 yards long and 98 yards wide. How many square yards does it contain? The area is what of 98 and 625? Find the perimeter.

1. If an 8-cent tablet lasts you 4 weeks, what is the cost of your tablets for a term of 20 weeks?

2. What must be paid for a knife at 30 cents and a pair of skates at 65 cents?

3. Elmer, Fred, and Joe spaded the family garden. Elmer spaded $\frac{1}{2}$ of it and Joe $\frac{1}{3}$ of it. What part did both spade? Can you find what part Fred spaded, if he finished the job?

4. What is the smallest number that is a multiple of 2, 3, and 5? Of 2, 4, 8, and 16? Of 2, 4, and 5?

5. $\frac{1}{2}$ and $\frac{1}{3}$ of a pound of sugar are what part of a pound?

6. If there are ten brown eggs in 9 dozen and the rest are white, how many are white?

7. One-eleventh of a class of 55 pupils are absent. How many are present?

Written.

Add:

1. $42\frac{1}{2}$	2. $83\frac{2}{3}$	3. $29\frac{1}{3}$	4. $49\frac{2}{3}$	5. $196\frac{3}{4}$
$65\frac{1}{3}$	$41\frac{1}{2}$	$68\frac{5}{6}$	$84\frac{2}{3}$	$25\frac{5}{8}$
6. $421\frac{1}{3}$	7. $93\frac{2}{3}$	8. $57\frac{7}{8}$	9. $18\frac{1}{2}$	10. $6\frac{1}{3}$
$89\frac{1}{2}$	$86\frac{2}{3}$	$82\frac{5}{8}$	$14\frac{3}{4}$	$4\frac{1}{2}$
			$5\frac{7}{8}$	$7\frac{5}{6}$
11. $48\frac{1}{2}$	12. $16\frac{1}{6}$	13. $85\frac{1}{3}$	14. $31\frac{1}{2}$	15. $9\frac{1}{8}$
$13\frac{3}{4}$	$12\frac{2}{3}$	$16\frac{1}{2}$	$53\frac{2}{3}$	$10\frac{3}{4}$
$5\frac{1}{8}$	$14\frac{1}{2}$	$12\frac{1}{6}$	$67\frac{2}{3}$	$12\frac{1}{2}$

16. The rent of a store is \$840 a year. How much rent must be paid for the store for $3\frac{1}{4}$ years?

Written.

1. Divide 495,018 by 534.

```
      927   Quotient.
534)495018
    4806
    1441      We get the quotient figures by saying,
    1068    "How many 5's in 49, in 14, in 37?"
    3738
    3738
```

NOTE. — Test every example by multiplication.

2. Divide 84,148 by 193. What will be your guide figure?

3. Divide 410,032 by 523.

4. Divide 18,432 by 512.

5. Divide 183,513 by 913.

Find the quotients: (See note, p. 165.)

6. $\frac{70794}{342}$	7. $\frac{252453}{817}$	8. $\frac{37995}{447}$	9. $\frac{8855}{385}$
10. $\frac{27268}{401}$	11. $\frac{476856}{716}$	12. $\frac{2048}{512}$	13. $\frac{63420}{604}$
14. $\frac{92008}{424}$	15. $\frac{619423}{827}$	16. $\frac{913632}{496}$	17. $\frac{98103}{617}$

Find quotients and remainders:

18. 12,324 ÷ 213.	25. 4,312 ÷ 99.
19. 32,634 ÷ 111.	26. 8,432 ÷ 761.
20. 22,724 ÷ 437.	27. 31,845 ÷ 301.
21. 23,919 ÷ 119.	28. 29,631 ÷ 405.
22. 18,647 ÷ 29.	29. 293,476 ÷ 310.
23. 11,502 ÷ 309.	30. 82,437 ÷ 3100.
24. 53,261 ÷ 205.	31. 487,500 ÷ 500.

1. 823,250 ÷ 125.
2. 277,749 ÷ 381.
3. 104,280 ÷ 165.
4. 84,728 ÷ 238.
5. 471,867 ÷ 543.
6. 142,692 ÷ 282.
7. 297,585 ÷ 381.
8. 748,774 ÷ 929.
9. 424,180 ÷ 835.
10. 309,912 ÷ 444.
11. 277,749 ÷ 729.
12. 104,280 ÷ 632.
13. 84,728 ÷ 356.
14. 471,867 ÷ 869.
15. 142,692 ÷ 506.
16. 297,585 ÷ 765.
17. 748,774 ÷ 929.
18. 424,180 ÷ 508.
19. 309,912 ÷ 698.
20. 73,475 ÷ 25.
21. 796,354 ÷ 88.
22. 307,056 ÷ 201.
23. 9,376,385 ÷ 812.
24. 6,375,003 ÷ 721.
25. 3,463,807 ÷ 365.
26. 438,964 ÷ 908.
27. 340,397 ÷ 791.

In examples 28–52 *find the missing factor:*

28. 25 × ? = 6250.
29. 75 × ? = 9975.
30. 39 × ? = 3627.
31. 65 × ? = 18,590.
32. 286 × ? = 18,590.
33. 435 × ? = 134,415.
34. 736 × ? = 308,384.
35. 419 × ? = 308,384.
36. ? × 47 = 37,882.
37. ? × 932 = 386,780.
38. ? × 786 = 57,378.
39. ? × 409 = 330,063.
40. ? × 57 = 74,442.
41. ? × 846 = 178,506.
42. ? × 64 = 77,312.
43. 6290 = 170 × ?
44. 322,240 = 40 × ?
45. 57,378 = 73 × ?
46. 330,063 = 807 × ?
47. 178,506 = ? × 211.
48. 74,442 = 1306 × ?
49. 3,534,200 = 8200 × ?
50. 842,400 = ? × 900.
51. 404,172 = ? × 436.
52. ? × 624 = 107,952.

1. How many pints are there in 568 gallons?

2. A grocer buys cinnamon at \$.50 a pound and sells it at 5 cents an ounce. *a.* How much does he gain on a pound? *b.* On 53 pounds?

3. 60,000 lb. of coal at \$5 per ton cost how much?

4. Mr. Adams bought 2 brake linings at 85¢ each, 3 spark plugs at 65¢ each, and one connecting rod at \$3.75. How much did he pay for all?

5. Subtract the sum of $5\frac{1}{2}$ and $7\frac{1}{4}$ from the sum of $8\frac{5}{8}$ and $9\frac{3}{8}$.

6. Mr. Tucker's telephone bill for one month had these extra charges: Bridgeport, 3 calls, 15¢ each; Derby, 1 call, 10¢; Meriden, 2 calls, 10¢ each; Windsor, 4 calls, 25¢ each. How much did all of these calls add to his bill?

Quick Mental Test

1. How many pints in 5 gallons?

2. In how many hours can you walk 12 miles if it takes you 15 minutes to walk one mile?

3. What is the cost of 24 quarts of clover seed at \$1 a peck?

4. Theodore picked 15 quarts of berries and sold $\frac{2}{3}$ of them at 10 cents a quart. How much did he receive?

5. What is the smallest number that exactly contains 3 and 2?

6. What is the difference between $\frac{5}{6}$ and $\frac{2}{3}$?

7. If two and one-half quarts of milk are taken from a can containing 2 gal., how many quarts are left?

8. $4800 \div 20 = ?$ 9. $25 \times 20 = ?$ 10. $12 + 3\frac{1}{3} = ?$

1. A square foot is how many inches long? Wide? It contains how many square inches?

2. Draw a square foot on the blackboard and cut it into square inches. How many are there?

3. A square yard is how many feet long? Wide? How many square feet does it contain? Show it by a drawing on the blackboard.

4. A square rod is how many yards long? Wide? What would you do to find how many square yards there are in 1 square rod? $5\frac{1}{2} \times 5\frac{1}{2} = 30\frac{1}{4}$. How many square yards in one square rod?

5. About how many square rods are there in the floor of your schoolroom?

6. A piece of land 8 rods wide and 20 rods long contains an acre of ground. How many square rods does it contain? How many square rods make an acre? Make on the blackboard a drawing of this piece of land, using 1 inch for 1 rod. Make it into lots 4 rd. wide and 8 rd. long. These are good-sized city lots. How many are there?

7. If your school ground is 132 feet from front to rear and 165 feet along the street, it contains a half acre. How many square feet does it contain?

8. Draw a picture of a field 28 rods long and 24 rods wide, using $\frac{1}{4}$ inch for a rod. How many square rods does it contain?

9. Draw a picture of a floor 35 feet long, containing 1050 square feet. Use $\frac{1}{2}$ inch for 1 foot. How wide is the floor?

THE TABLE OF SURFACE MEASURE

144 square inches (sq. in.) make 1 square foot
9 square feet (sq. ft.) make 1 square yard
30¼ square yards (sq. yd.) make 1 square rod
160 square rods (sq. rd.) make 1 acre (A.)

NOTE. — In working the following examples, first answer to yourself these questions about each one: *a. What is given? b. What am I asked to find? c. Will the answer be greater or less than the number given?*

Oral.

1. How many square yards in 108 sq. ft.?
2. How many square rods in ¼ A.?
3. A floor 4 yd. long and 3 yd. wide contains how many square yards? How many square feet?
4. The front of a desk drawer is 20 in. long and 5 in. wide. It contains how many square inches?

Written.

1. How many square feet in 437 sq. yd.?
2. How many square inches in 94 sq. ft.?
3. How many square yards in 48 sq. rd.?
4. How many square rods in 26 A.?
5. How many square yards in 3933 sq. ft.?
6. How many square feet in 13,536 sq. in.?
7. How many acres in 4160 sq. rd.?
8. Change: *a.* 124 A. to square rods; *b.* 36 sq. rd. to square yards; *c.* 523 sq. yd. to square feet; *d.* 12 sq. ft. to square inches.

1. *The area of a rectangle is always the product of what two factors?*

2. *The number of square inches in a rectangle is the product of what two numbers?*

3. *The number of square yards in a rectangle is the product of what two numbers?*

4. *When a product and one of its factors are given, how can you find the other factor?*

5. The length of a map is 8 feet. Its width is $5\frac{1}{2}$ ft. What is its area?

6. A piece of pasteboard 20 inches long must be how wide to contain 120 square inches?

7. A rug 3 yd. wide and 4 yd. long covers how many square yards of floor? How many square feet?

8. A flag is 3 yd. long and 2 yd. wide. It is how many feet long? Wide? Find in two ways the number of square feet in it. Make pictures.

9. A door mat is 20 inches by 30 inches. Find its area.

10. Mrs. Smith's rose bed is 2 yd. wide and covers 48 sq. yd. of ground. How long is it?

11. Mr. English has a lawn 3 rd. by 5 rd. In one corner is a summer house covering $1\frac{1}{4}$ sq. rd. and in another corner is a fern bed covering $\frac{3}{4}$ sq. rd. How much surface is left for grass? (Picture, using 1 in. for 1 rd.)

12. Herbert has a pansy bed 4 ft. by 12 ft. There are 2 plants in every square foot of ground. How many plants in the bed? (Picture, using $\frac{1}{4}$ in. for 1 ft.)

Change:

1. 96,000 sq. rd. to acres.
2. 5616 sq. in. to square feet.
3. 3429 sq. in. to square feet and square inches.
4. 1683 sq. ft. to square yards.
5. 4346 sq. ft. to square yards and square feet.
6. 1837 sq. rd. to acres and square rods.
7. 13 sq. ft. 72 sq. in. to square inches.
8. 43 sq. yd. 7 sq. ft. to square feet.
9. 48 sq. rd. 13 sq. yd. to square yards.
10. 12 sq. yd. 4 sq. ft. to square feet.
11. 14,256 sq. in. to square feet; to square yards.
12. Find the area of a door mat 25 in. by 36 in.

Problems 13–16 are for the strong pupils.

13. Mr. Welton's cornfield is 25 rd. by 32 rd. *a*. How many square rods of land in the field? *b*. How many acres? *c*. How much corn does it yield at the rate of 46 bu. per acre? *d*. How much is the corn worth at $.60 per bushel?

14. A rectangular farm which is half a mile long must be how wide to contain 100 acres?

HINT. — The farm must contain how many square rods? It is how many rods long?

15. How many square inches in the top of a table that is 4 ft. long and 3 ft. wide?

16. At 45 cents a square yard, what would be the cost of matting to cover a floor 15 ft. by 18 ft.? (This may be found in three ways.)

Written.

(For strong pupils.)

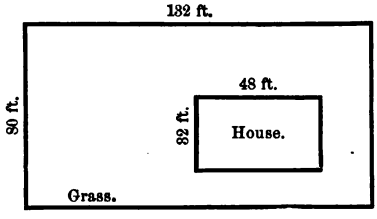
1. Mr. Hadley owned a piece of land 39 rd. by 24 rd. How many square rods had he left after selling $\frac{3}{4}$ of an acre?

2. A square mile is how many rods long? Wide?

a. It contains how many square rods?

b. It contains how many acres?

3. A square park is $\frac{1}{4}$ mi. on a side. *a.* How many square rods does it contain? *b.* How many square yards? *c.* How many acres? *d.* How much is it worth at \$200 per acre?



4. *a.* How many square feet are there in this entire lot? *b.* How many square feet of ground are occupied by the house? *c.* How many square feet of grass are there?

5. A man cut an acre of land into 5 building lots and sold four of them. The first contained $27\frac{3}{4}$ sq. rd., the second 36 sq. rd., the third $30\frac{5}{12}$ sq. rd., the fourth $29\frac{5}{8}$ sq. rd. The fifth one he kept. *a.* How many square rods of land did the man sell? *b.* How much land did he keep?

6. Mrs. Rich bought a rug 12 ft. by 18 ft., and another 15 ft. by 21 ft. How many square yards of floor will both rugs cover?

7. What is the cost of a sidewalk 6 ft. wide in front of three fifty-foot lots if it costs 14 cents a square foot?

I. *Add:*

1.	2.	3.	4.	5.
397	$138.49	768	$12.99	4086
498	6.52	546	6.28	9798
684	8.79	987	143.72	8469
963	7.56	645	24.08	3578
589	109.84	867	16.49	5946
786	3.58	988	4.45	9894
999	17.75	789	9.78	8765

II. *Add:*

1.	2.	3.	4.	5.
$5\frac{7}{8}$	$9\frac{5}{6}$	$14\frac{5}{8}$	$13\frac{2}{3}$	$16\frac{3}{8}$
$4\frac{3}{4}$	$4\frac{5}{6}$	$13\frac{1}{2}$	$5\frac{1}{6}$	$15\frac{3}{4}$
$7\frac{1}{2}$	$8\frac{2}{3}$	$14\frac{3}{4}$	$3\frac{5}{6}$	$12\frac{1}{2}$
$3\frac{5}{8}$	$5\frac{1}{2}$	$2\frac{5}{8}$	$4\frac{1}{2}$	$11\frac{7}{8}$

III. *Subtract:*

1.	2.	3.	4.	5.
$14\frac{5}{6}$	$7\frac{5}{8}$	$17\frac{3}{8}$	18	24
$6\frac{2}{3}$	$4\frac{1}{2}$	$3\frac{1}{4}$	$14\frac{3}{8}$	$21\frac{13}{18}$

IV. *Multiply:*

1.	2.	3.	4.	5.
729	897	976	298	365
38	89	76	49	75

V. *Find the quotients:*

1. $\frac{4368}{78}$ 2. $\frac{1908}{18}$ 3. $\frac{1829}{17}$ 4. $\frac{3264}{16}$ 5. $\frac{2625}{25}$

VI. 1. $21\frac{1}{3} - ? = 4\frac{5}{6}$. 2. $7\frac{3}{8} + ? = 43\frac{3}{4}$.

3. $161 = 97\frac{5}{7} + ?$ 4. $85 \times ? = 26{,}095$.

Oral.

1. What is the cost of 30 tons of hay at \$15 a ton?

2. If 7 acres of land cost \$200, what will 14 acres cost?

3. 3200 ounces make how many pounds?

4. When $\frac{1}{2}$ lb. of tea costs 20 ¢, what must be paid for $\frac{1}{4}$ of a pound? For $\frac{3}{4}$ of a pound?

5. If the school clock gains two minutes every day, in how many days will it gain an hour?

6. Will has \$2$\frac{1}{4}$ and James \$3$\frac{1}{2}$. How many dollars have both? How much less than \$10?

7. What is the smallest multiple of 5, 2, and 4?

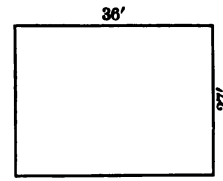
Written.

1. 8 bu. of cranberries were put in quart boxes and sold at 18 cents a box. *a.* How many boxes were there? *b.* How much did they bring?

2. How many pints in 5 bu. of bird seed?

3. How many ounce weights will just balance 8 lb.?

4. What will it cost at 18¢ a square yard to pave this cellar with concrete?



5. How many hundredweight in 5 sacks of feed, each containing 120 lb.?

6. What was the cost of a paved road from Jamestown to Frewsburg, 5$\frac{1}{2}$ miles, at \$10,800 a mile?

I. *Add and test by adding in a different order. Can you finish in five minutes?*

1.	2.	3.	4.
3288	$9.60	$8.15	$77.19
796	7.29	3.98	5.82
905	8.48	4.86	93.70
3086	.99	18.23	6.08
4579	7.38	10.09	7.83
480	6.09	6.06	28.42
739	1.08	70.30	7.86

II. *Subtract:*

1.	2.	3.	4.
1398	$14.67	$28.32	$6.87
609	9.99	19.23	.89

III.
1. 2481×329.
2. 7206×702.
3. 1930×620.
4. 839×900.
5. 207×6800.

IV.
1. $\$379.60 - \$239.87$.
2. $52{,}006 - 42{,}009$.
3. $63{,}421 - 7381$.
4. $9307 - 8798$.
5. $72{,}860 - 68{,}462$.

V.
1. $81{,}385 \div 397$.
2. $81{,}385 \div 205$.
3. $362{,}141 \div 89$.
4. $431{,}072 \div 709$.
5. $431{,}072 \div 608$.

VI. *Find the quotients:*

1. $\frac{355995}{81}$
2. $\frac{642510}{726}$
3. $\frac{2610580}{643}$
4. $\frac{359072}{49}$
5. $\frac{245754}{246}$

Oral.

1. What is the cost of a 10-pound turkey at 28¢ per pound?

2. $\frac{7}{9}$ of 45 = ?

3. A 4-foot stick of wood will make 3 equal pieces how many inches long?

4. Multiply 12 by $4\frac{1}{4}$. (Problem.)

5. A rectangle 3 ft. wide, containing 24 sq. ft., is how long? What is its perimeter?

6. How many square inches in a 5-inch square?

7. How many rods of fence will inclose a field $10\frac{1}{2}$ rods square?

8. A cask holds $48\frac{3}{4}$ gal. of water. If $20\frac{1}{2}$ gallons leak away, how many gallons remain?

Written.

1. What must be paid for 12 tons of grate coal at $7.35 a ton and 4 tons of chestnut coal at $8.50 a ton?

2. If 10 men earn $120 a week, what will 6 men earn at the same rate?

3. Elsie spent $\frac{1}{4}$ of $5 for a book and the remainder for a pair of shoes. What did the shoes cost?

4. At $1.20 a gallon, what is the cost of 10 qt. of ice cream?

5. A clock that ticks twice every second ticks how many times in an hour?

6. If a bushel of corn weighs 56 lb., how many bushels of corn in a car load weighing 14 tons?

I. Find quotients and remainders and test your work:

1. $\frac{34976}{186}$ 2. $\frac{42695}{268}$ 3. $\frac{397518}{137}$ 4. $\frac{860751}{614}$

5. Make a problem for $6375 \div 25$.

II. *Add:*

1.	2.	3.	4.	5.
$3\frac{3}{4}$	$4\frac{5}{8}$	$4\frac{2}{3}$	$8\frac{3}{4}$	$2\frac{5}{6}$
$5\frac{1}{8}$	$11\frac{3}{4}$	$6\frac{1}{2}$	$7\frac{7}{8}$	$5\frac{2}{3}$
$7\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{5}{6}$	$5\frac{1}{2}$	$6\frac{1}{2}$
$4\frac{5}{8}$	$8\frac{7}{8}$	$8\frac{1}{3}$	$3\frac{3}{4}$	$8\frac{2}{3}$

III. 1. A merchant bought 44 yd. of silk for \$39.16 and sold it so as to gain \$16.72. *a.* For how much did he sell it? *b.* At what price per yard did he sell it? *c.* At what price per yard did he buy it? *d.* What did he gain on a yard?

2. How many half-bushel baskets will hold 400 qt. of cranberries?

3. Mr. Rich sold his horse for \$275 and his carriage for \$125. He then bought an automobile for 3 times as much as he received for the horse and carriage. What did the automobile cost?

4. A farmer shipped to the city 32 cans of milk, each can containing 40 quarts. *a.* How many gallons did he ship? *b.* What was the milk worth at $6\frac{1}{2}$ cents a quart?

5. How many yards of cloth in 3 remnants containing $\frac{1}{2}$ yd., $2\frac{3}{8}$ yd., and $5\frac{1}{4}$ yd., respectively?

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